FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

FEED THE FUTURE RWANDA ORORA WIHAZE ACTIVITY

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BASELINE REPORT

USAID
FROM THE AMERICAN PEOPLE

Prepared for the United States Agency for International Development (USAID) by:
MarketShare Associates (MSA)

With thanks and participation from the Venture37 and other consortia members Catholic Relief Services and the Manoff Group in data collection and review of analysis.

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Acronyms

AHS	Agricultural Household Survey
ASF	Animal Sourced Foods
BDS	Business Development Services
BII	Business Innovation Index
CRS	Catholic Relief Services
CFSVA	Comprehensive Food Security and Vulnerability Analysis
FCS	Food Consumption Scores
FTF	USAID Feed the Future
FTFMS	Feed the Future Monitoring System
GFSS	Global Food Security Strategy
I/NGO	International / Non-Governmental Organization
MAD	Minimum Acceptable Diet
MSA	MarketShare Associates
MSD	Market System Development
NISR	National Institute of Statistics of Rwanda
PSDAG	Private Sector Driven Agriculture (USAID Rwanda)
PIRS	Performance Indicator Reference Sheets
PWD	People with Disabilities
RAB	Rwanda Agriculture and Animal Resources Development Board
RSB	Rwandan Standards Board
SACCO	Savings and Credit Cooperatives
TMG	The Manoff Group
USAID	United States Agency for International Development
Venture37	Land O'Lakes Venture37
ZOI	Zone of Influence

Executive Summary

Evaluation Background

The Feed the Future Rwanda Orora Wihaze Activity (Orora Wihaze), funded by the United States Agency for International Development (USAID), aims to sustainability increase the availability of, access to, and consumption of animal sourced foods (ASF) in eight districts across Rwanda. The Activity, implemented by Land O'Lakes Venture37 (Venture37), works to strengthen goat and sheep, poultry, swine and fish value chains while increasing consumption of ASF, especially by women and children. Orora Wihaze follows a market systems development approach, where agreed, interventions will work through existing market actors to change how they interact with customers and suppliers to meet the Activity goals.

This baseline answers five evaluation questions, which relate to trust and cooperation, business innovation, inclusive value creation, and ecological factors affecting ASF consumption and market linkages.

Evaluation questions were answered through collection and analysis of primary qualitative data. The evaluation team conducted over 300 interviews with ASF market system actors in Rwanda in February and March of 2020. Interviews were coded using NVivo software and analysis was conducted to identify themes and findings for each evaluation question.

This baseline is intended to provide an initial understanding of the goat, sheep, poultry, swine and fish market systems. By establishing the baselines for three market systems index indicators, Orora Wihaze has a qualitative snapshot that will be used as a starting point to changes in system dynamics and the norms and behaviors in the market system. This baseline also establishes quantitative baseline figures for intervention-level result indicators based on secondary data. As is typical in market systems approaches, the project will not know its participants until partnerships are established. As these partners are identified, the project will undertake a rolling baseline with partners and the farmers and consumers which they will supply, buy from, and impact to establish the quantitative baselines from which to measure progress of interventions.

Findings

- **Cooperation and Trust Index:** The ASF market system was found to have a medium degree of cooperation (1.25 on a scale of 0 to 3) and trust (1.43). While actors value cooperation, many transactions are spot market based, especially among smaller businesses. Even those who have more stable commercial relations may have limited ability to cooperate and coordinate because of limited record keeping. Trust, earned over time, is often extended through informal value chain credit and while this appears to largely work well there are of course some who take advantage of it. Consumer trust in the quality of feed is low.
- **Business Innovation Index:** Business innovation received a score of 0.25 (on a scale of 0 to 1). Innovation is highest in the input market function at nearly 0.35 and lowest in the supply function at 0.18. Innovation scores are lowest for women and both men and women 30 and over, at 0.2 for each. On the other hand, youth are the most innovative demographic with a score of 0.32 while men score 0.27.
- Both **women and youth** often lack access capital for entrepreneurship. While women are often involved in looking after small livestock in the backyard, they may not be the ones purchasing inputs. Youth are valued as employees for their availability, motivation and physical strength, among other reasons. PWD are seen to face challenges in access to many ASF occupations besides retail.
- **Ecological Factors Index:** Ecological factors affecting food consumption received a total score of 1.21 on a 0 to 3 scale. Relatively high cost puts regular consumption of many ASF products outside of many households' reach. Consumption of meat by individuals (especially men) at restaurants or family

consumption at special occasions is more common. There is relatively high confidence in the safety of ASF due in large part to vet inspections of animals before slaughter. However, there is less confidence in slaughterhouse safety.

- For **market linkages**, the use of formal contracts is not common especially for linking producers to markets. Short term value chain credit is common through buy now-pay-later arrangements that involve some risk for the lender but are still deemed important for attracting and keeping customers. Finance through banks is not popular in the ASF market system while savings and credit organizations are more common but have modest loan sizes, resulting in a "missing middle." Prices appear to be predominantly driven by sellers and their cost of production which makes the ASF market system extremely sensitive to the cost of feed, which is currently at an all-time high.

Next Steps

Findings from this baseline will be used for a number of purposes:

1. **Setting Market System Level Baselines:** The project will track changes in trust and cooperation, business innovations and ecological factors for consumption in the target market systems throughout the project using similar qualitative methods. This baseline establishes the starting point from which to compare changes in these aspects of the market system.
2. **Provide Context to issues in the target markets systems:** This baseline provides context about how the goat, sheep, fish, pig, and chicken value chains currently work in Rwanda and identifies some issues for further exploration.
3. **Inform the Orora Wihaze Strategy:** Findings from this report, the market analysis, and the consumption study all inform the development of the Orora Wihaze Strategy that will highlight and recommend which constraints in the market system need to be addressed to reach the Activity goals and objectives.

This baseline does not provide broad recommendations, because that is the purpose of the Orora Wihaze Strategy. During the development of the strategy, the team will use information from all three studies that look at different aspects of the market system. Making recommendations from only one data source is premature and could results in recommendations that are not in line with findings of other studies.

1. Introduction

1.1. Project background

Context

Food security in Rwanda has not kept pace with the country's impressive per capita income growth. The share of the population in Rwanda whose food intake is insufficient to meet dietary energy requirements (undernourishment) increased from 32.5 percent in 2012 to 36.8 percent for 2017. By comparison, the regional prevalence of undernourishment in 2017 was 22.8 percent. Nearly 38 percent children under 5 years old in Rwanda suffer from stunting, which is evidence of chronic malnutrition.[1]

Low food security is driven in part by low consumption of animal sourced foods. The 2018 Comprehensive Food Security and Vulnerability Analysis (CFSVA) in Rwanda, led by the World Food Programme with partners including the Government of Rwanda, the United States Agency for International Development (USAID), the European Union, and the United Nations Children's Fund, found that the share of the population with acceptable Food Consumption Scores declined from 79 percent in 2010 to 76 percent in 2018. Those households with Poor or Borderline scores (24 percent of the population) were found to consume no animal sourced foods. Furthermore, the CFSVA found a positive relationship between livestock ownership and food security.[2]

Project Design

Against this backdrop, the Feed the Future Rwanda Orora Wihaze Activity was conceived by USAID with the goal to sustainably increase the availability of, access to, and consumption of ASF. Orora Wihaze (which means raising livestock for self-sufficiency), is implemented by Venture37 along with partners including Catholic Relief Services (CRS), Market Share Associates (MSA), The Manoff Group (TMG), and local partner Urunana Development Communications. Orora Wihaze has two objectives: 1) Strengthen inclusive private-sector led ASF value chains, specifically goats and sheep (shoats), fish, pigs and chicken, and 2) Increase the demand for ASF consumption by women and children.

Orora Wihaze takes a market system development (MSD) approach to achieving its two objectives and goal. The MSD approach aims to enable micro, small and medium enterprises and other organizations in the market system to strengthen ASF value chains. It relies on evidence-based social and behavior change (SBC), both to achieve this objective and to increase demand for ASF by women and children. Activities will be designed under six broad intervention areas: production, product markets, end market access, financial services, nutrition extension, and women's empowerment. The MSD implementation model for activity design and implementation involves learning, then generating, testing and scaling ideas, all in collaboration with market system actors.

Target beneficiaries will be ASF producer and consumer households in Burera, Gakenke, Nyamagabe, Nyamasheke, Rutsiro, Ngororero, Kayonza and Ngoma districts. The project aims to purposefully target households led by women, youth and persons with disabilities (PWD). By the end of this five-year activity, USAID aims to have increased the income of 125,000 households by 30%, increased farmer and firm sales by

[1] USAID IDEA. Rwanda: Hunger and Food Security, accessed April 2020.
[2] World Food Programme (2018). Rwanda: Comprehensive Food Security and Vulnerability Analysis, December 2018.

45% and 35%, respectively, and increased the prevalence of children under 2 and women of reproductive age receiving a minimum acceptable diet by 40% over baseline.

1.2. Evaluation Purpose and Questions

The purpose of this baseline evaluation is to establish the starting point for three market systems index indicators and to learn more about the ASF market system. This purpose is to be achieved by answering the five baseline evaluation questions below. Three of these evaluation questions - 1, 2 and 4 - are the basis for the market systems indicators. Market system indicators measure changes in system dynamics, norms and behaviors. The other two evaluation questions - 3 and 5 - aim to generate responses that produce knowledge about the ASF market system that is valuable to Orora Wihaze in understanding the market system and assessing changes over time. The evaluation questions, shown below, are answered in their own subsections in section 3.

- **Evaluation Question 1 – Trust and Cooperation (indicator).** What formal and informal rules and expectations between producers and other market actors affect the flow of information, financing, and commercial exchange of goods and services?
- **Evaluation Question 2 – Business Innovation (indicator)***:* What kinds of changes—organizational, marketing, process, or product innovations—are agricultural market actors making to their business models, if any? What is the pace at which changes are being made?
- **Evaluation Question 3 – Inclusive Value Creation***:* To what extent are market actors designing improved technologies, or implementing production and management practices to be inclusive of women, youth, and PWD?
- **Evaluation Question 4 – Ecological factors affecting ASF consumption (indicator):** What aspects of the family or home environment related to food intake (e.g. home availability or accessibility of certain foods) are linked with dietary behavior?
- **Evaluation Question 5 – Market linkages:** What types of market linkages and supply-chain coordination and development models for animal sourced foods across the implementation districts are most effective in linking farmers to profitable markets and improving quality and efficiency in the market?

In addition to answering these five evaluation questions, this baseline evaluation also provides context to intervention-level indicators through review of secondary data, as detailed in section 3.1.

2. Methodology

This section details the evaluation matrix used for methodological approaches; tools, targeting, and implementation of qualitative data collection; and coding and analysis of data. Annex II outlines the Baseline Scope of Work.

2.1. Evaluation matrix

Table 1 shows the evaluation matrix with summaries of the methodological approaches used to answer each evaluation question. It also shows how intervention level baseline indicator values are set. Note that in addition to directly providing indicator baseline values for the market systems indices, responses for evaluation questions 1, 2 and 4 also include further descriptive analysis of findings based on the qualitative data.

Table 1: Evaluation matrix

Evaluation question	Methodology overview
Evaluation Question 1 – Trust and Cooperation	Scale index value from 0 to 3 based on analysis of qualitative data.
Evaluation Question 2 – Business Innovation Index	Scored from 0 to 1 based on the number of innovations reported by respondents through qualitative data collection.
Evaluation Question 3 – Inclusive value creation	Descriptive findings-based analysis of qualitative data.
Evaluation Question 4 – Ecological factors affecting ASF consumption	Scale index value from 0 to 3 based on analysis of qualitative data.
Evaluation Question 5 – Market linkages	Descriptive findings based on analysis of qualitative data.
Intervention level baseline values	Assessed through secondary research or in some cases through primary data collection to be conducted by the project at time of initial stakeholder engagement.

2.2. Qualitative data collection

This baseline evaluation utilizes qualitative data to answer the five evaluation questions. Qualitative data were collected through interviews in Rwanda between February and March of 2020, following approval from the Rwanda National Ethics Committee (RNEC). Over 300 interviews were conducted using 14 question guides, and were subsequently coded and analyzed to answer the evaluation questions.

Tools

The baseline team created semi-structured question guides through an iterative process that started with general questions and ended with specific questions for different respondent types. First the team identified the multiple question areas needed to answer each evaluation question. For example, for evaluation question 3, the two question areas were 1) action/planned action in marketing to or working with youth, women or PWD and 2) challenges and opportunities encountered. These question areas were turned into generic questions which were in turn customized for each of the four market system functions: supply, input, support and enabling. Within each market system function, where necessary, questions further customized to specific respondent type.

In total, 14 different question guides were developed and used to conduct interviews with 41 different respondent types. The relatively limited number of different question guides compared to respondent types reduced the learning curve for interviewers. Interview guides were translated into Kinyarwanda. Table 2 on the next page shows the questionnaires, respondent types and total number of interviews conducted for this evaluation. It also shows how actor types (respondents) are categorized by market system function. See Annex 1, Summary of Interviews, for more details about the market actors surveyed, including the geographic locations by districts.

Table 2: Questionnaires, respondents and number of interviews

Market system function	Questionnaire	Respondent type	# of interviews
Supply	Producers	Backyard producers	13
		Small semi-commercial producers	15
		Medium to large commercial producers	12
	Producer groups and coops	Producer groups and cooperatives	18
	Output traders and processors	Collectors/aggregators	8
		Output wholesalers	10
		Exporters	6
		Slaughterhouse/abattoirs, butchers, processors	16
	Output retailers	Small retail store	11
		Stall at market	5
		Supermarket	5
		Restaurants/hotels	14
	Consumers	Consumers (individuals)	43
Inputs	Input Retailers & Wholesalers	Agrodealers/input suppliers	17
		Vet pharmacies	10
		Input wholesaler	9
	Input manufactures	Hatcheries/multiplication center	5
		Breeder	3
		Feed manufacturer	10
	Vets	Private vets	22
Support	Transport	Transporter	3
	BDS	BDS	5
	Finance	Banks	5
		Microfinance	3
		Mobile finance	1
		Government finance	3
Enabling	Policy and implementers	National government	3
		Local government	14
		I/NGOs	4
		Youth, women or PWD organization/platform	2
		Business association	3
	Research	Government researcher	3
		University researcher	1
		Private sector researcher	2
	Media	Newspaper, TV and radio	4
		Total	308

Respondent targeting

Initially, the baseline team identified respondent types and decided on the number of each respondent type to interview through secondary research. Non-probability quota sampling was used to include a distribution of actors by type, location and value chain. Actor types and quotas for number of interviews were refined in consultation with the Orora Wihaze team. Interviews were targeted for all four project regions (two districts per region) as well as Kigali, for all four value chains, and for all 35 actor types. In total, 53 interviews were targeted for each of the four project regions (totaling 212) and 82 for Kigali. In order to ensure coverage of all four value chains, each of the four project regions was given a value chain focus: poultry in the Eastern province, shoats in the Northern province, fish in the Western province and swine in the Southern province. Interviewers were instructed to conduct about half of their interviews within their targeted value chain. Respondent contacts were identified in advance by the Orora Wihaze team but also as fieldwork was ongoing through referral. Interviewers were also instructed to carry out interviews in different parts of each targeted district, including urban and rural areas.

Figure 1: Chicken Producer Group

Value chain referral case studies provide a snapshot of the relations between actors in a value chain. One referral case study was carried out in each region and focused on that region's targeted value chain. Starting with a producer already targeted for interview, interviewers identified four other connected businesses by asking for referrals to businesses with whom the producer did business and later businesses those did business with. These four single-page 'market linkages snapshots' are presented throughout the Findings Section.

Fieldwork implementation

Interviews were conducted by the eight members of the Orora Wihaze field team in all eight project districts, and by Orora Wihaze Kigali-based staff in Kigali. Fieldwork teams were divided into two per region, and the teams were managed by one person from the Kigali office. MSA led the team in fieldwork planning, training and piloting the week of February 10, 2020. Following a day of logistics planning, MSA led a day long training for interviewers was held in Kigali. The training covered the purpose of the baseline, the logistics of the fieldwork, the content of the question guides and the system for uploading notes and keeping track of progress. Training was followed by two days of supervised interviews and then a half day of debrief.

Interviews were conducted from February 24 to March 6, 2020. Each interview was conducted by a single interviewer in Kinyarwanda using the 14 question guides and a notepad and pen. Later, interviewers typed up their notes in English and uploaded them to an online team shared drive. This system allowed data collection teams to track their progress against targets and for management to monitor progress and quality. A total of 308 interviews were completed (with 25 percent female respondents and 22 percent under 30) and notes uploaded as shown in Table 2 above. [3] A more detailed breakdown of interviews by region is found in the annexes.

[3] Note that the number of interviews used for analysis, 298, is slightly less than this total due to some duplicate or low information interviews.

2.3. Data analysis

Coding

The baseline team coded all interviews using the computer-assisted qualitative data analysis software program NVivo. Codebooks were created with nodes for each evaluation question and sub-nodes for each evaluation question area. Through NVivo researchers can access all the text across all of the interviews categorized by node and sub-node and disaggregate by location, actor type, value chain, sex, age, and other relevant characteristics. The evaluation team who carried out the coding worked with the interviewers to clarify their notes where needed.

Analysis

The baseline team analyzed the coded results by reading through the coded parts of interviews and identifying themes and findings that were responsive to each research question.[4] These themes and findings were supported using the excerpts from the interviews from which they were identified. The evaluation team shared their analysis internally, to vet whether findings and themes identified were supported by the data and responsive to the evaluation questions. The results of this vetted analysis are the basis for the findings in the next section where all five evaluation questions and findings are presented.

The evaluation team also used the analyzed data from the five evaluation questions for three market systems indicators that will be used to measure progress in changing the market systems in Rwanda: Business Innovation Index, Trust and Cooperation Index, and Ecological Factors Index. Questions on inclusive value creation and market linkages help Orora Wihaze understand the nature of the dynamics and relationships in the market system, but do not result in an indexed benchmark, while the other three that follow do.

Business Innovation Index

The Business Innovation Index (BII) measures the innovation level in a market system. BII was developed by MSA and has been used for several MSD evaluations, most recently for a USAID baseline in Mozambique. The index comprises of responses to yes/no questions on 13 innovations types in a six-month retrospective time frame. The index is on a scale of 0 to 1 and is constructed by multiplying the number of innovations reported by a respondent by 0.2. If a respondent has more than five innovations, their score is 1.

During the supervised interviews, the baseline team discovered that many of the 13 innovation questions were not relevant for producers. Furthermore, some innovations, like the use of a new feed type were not captured by the index. Therefore, the BII was modified and simplified for producers, producer groups and cooperatives. Only three questions on innovations were used for these respondent types, while the other respondent types were asked the full set of 13 innovation questions. To normalize the BII scoring index calculation, BII calculation for these respondent types was adjusted as follows: 1 innovation is scored as 0.2, 2 innovations is scored as 0.5, and 3 innovations is given a score of 1.

Trust and cooperation

Trust and Cooperation measure the informal rules and expectations in the market system that govern behavior and set expectations among and between market actors. Both norms are measured on an indexed scale from 0 (low) to 3 (high) of levels of expectations between providers and consumers, which was first constructed and applied on the Mozambique FTF Inova program in 2018. The index values are constructed by analyzing the dimensions of trust (integrity, competence, and reliability), and the dimensions of cooperation (belief in the

[4] The team used Framework Analysis as a deductive approach and grounded theory to allow for emergent themes.

importance of ongoing relationships, and belief in mutually beneficial purpose) according to the assessment criteria, using thematic analysis, as detailed later in the findings section, for each dimension.

Ecological factors

Ecological factors gauge the contextual aspects of the market system, in the home and community, that may influence dietary behaviors. Fourteen ecological factors were identified using an inductive approach by conducting a series of interviews about expectations of what may influence whether ASF is consumed or expected to be consumed, and by whom. Analysis of these interviews was complimented by observations at restaurants, retail markets, and other venues, as well as by secondary sources like newspaper articles and research studies. Once the factors were identified, using this inductive approach, they are measured on an indexed scale from 0 (low) to 3 (high) according to the strength of influence as expressed by the respondents and coded using thematic analysis. Each factor was then ranked as low, medium, or high, by the research team panel in a data interpretation workshop. Each rating was assigned a value 0.5, 1.5, or 2.5 and then averaged for the total value. The range for the final scoring is Low (0.00-0.99), Medium (1.00-1.99) and High (2.00-3.00). The index considers three levels of the market system—the individual (agent-level), the interpersonal (networks), and the institutional (norms) as detailed in the Findings section.

2.4. Secondary data

Secondary research during the baseline helps to set the initial baseline values for some Orora Wihaze indicators and provides additional context. Secondary data sources include USAID, the World Bank, the Government of Rwanda and other sources to understand the context for intervention level indicators. Baselines will be updated throughout the implementation period, on a rolling basis as partnerships are formed. This is a standard practice when using an MSD approach.

3. Findings

3.1. Market system and intervention indicators

This baseline assessment serves to document the current health and context of the market system that supports ASF in Rwanda.

Orora Wihaze uses two types of indicators to measure changes at both the system and intervention levels. **Market System indicators** are a set of custom indicators that have been selected to measure the health of the market system, and the impact that the Activity's interventions have on the way the market system overall functions. These market indicators are discussed further in this report and baseline values are established. The three market system level indicators are listed below. Performance Indicator Reference Sheets (PIRS) for these indicators can be found in Annex 4:

- #5 Observed shifts in trust and cooperation between smallholder producers and other market actors
- #12 Average business model innovation score
- #16 Observed shift in ecological factors related to food intake

Intervention indicators, in contrast, are a combination of both custom and FTF initiative standard indicators,[5] guided by the Global Food Security Strategy (GFSS). We set initial baselines values for these indicators based on secondary data available in the project region and Orora Wihaze's rolling baseline for their first three activities conducted in October 2020. Initial baseline values and further context from secondary data are

[5] Feed the Future (2019). Feed the Future Indicator Handbook. Revised September 2019.

described in Table 3 below. Three main sources of secondary data used are introduced below, including how well they represent our target population.

- **Hinga Weze Baseline[6]:** A USAID project that aims to sustainably increase farmers' income in the beans, maize, orange flesh sweet potato, Irish potato, horticulture values chains and improve nutritional status of women and children, Hinga Weze carried out a baseline assessment with farmer households in February 2018. The population-based farmer survey was conducted in 10 districts. Six of these districts overlap with the target area of Orora Wihaze: Nyamagabe, Nyamasheke, Rutsiro, Ngororero, Kayonza and Ngoma; four of them do not: Gatsibo, Bugesera, Nyabihu, Karongi. This baseline provides values for three of Orora Wihaze's nutrition indicators (#2, 3, and 4).
- **FTF Rwanda ZOI Interim Report[7]:** USAID commissioned a ZOI assessment carried out in 2014/15 and published in 2016 that conducted a population-based farmer household survey across the 27 districts in the ZOI. Orora Wihaze will be implemented in 8 out of these 27 districts. This report provides some of the values for reference.
- **Comprehensive Food Security and Vulnerability Analysis (CFSVA)[8]:** This 2018 study led by the World Food Programme with partners including the Government of Rwanda, the United States Agency for International Development (USAID), the European Union, and the United Nations Children's Fund, carried out a household survey across all of Rwanda that is statistically relevant at the district level. This allows Orora Wihaze to look as the findings for each of its 8 target districts. However, the district level data did not provide information on Orora Wihaze's exact indicators so will only be able to provide context.

While initial baseline values are set through secondary data and our first rolling baselines, baselines for our specific participants will be updated on a rolling basis throughout the activity as partner organizations and participants are identified.

Table 3: Market system and intervention indicators, baseline values and status findings

#	Indicator	Baseline Value	Findings/Context
1	Number of households with incomes increased by at least 30%	0[9]	According to the World Bank, per capita income in Rwanda was $773 USD/year on average in 2018, which represents a steep increase from $199 in 2002.[10] The NISR estimates that about 62.8 percent of Rwandan households (ca. 1.7 million households) are in livestock, with a majority of them owning cattle (61%), goats (53.6%), poultry (33.7%), pigs (30.6%), sheep (18.1%).[11] Other sources highlight that fish farming has doubled output between 2010 and 2017.[12] More detailed information on the distribution (%) of agricultural households' population by district is available in the appendices of the 2017 AHS.[13] The overall target for Orora Wihaze is to increase the incomes of more than 125,000 households involved in the production of ASF in target districts by 30%.

[6] Feed the Future (2018). Hinga Weze Baseline Report, Cultivating New Frontiers in Agriculture (CNFA)
[7] Feed the Future (2016). Feed the Future Rwanda 2014-2015 ZOI Interim Assessment Report. Rockville, MD: Westat.
[8] World Food Programme (2018). Rwanda: Comprehensive Food Security and Vulnerability Analysis, December 2018.
[9] The baseline value is 0 because it is measuring the number of households that have increased their income as a result of the project, and by definition, zero households have increased their income yet. Initial income values will be collected from potential participants on a rolling basis as the Activity partners with market actors to implement new ideas. Changes in income will be measured through annual catchment surveys.
[10] The World Bank (2018). World Development Indicators – Rwanda.
[11] National Institute of Statistics of Rwanda (2018). Agricultural Household Survey, 2017 report
[12] The New Times (2017). Improved animal resources management and production for sustainable income, improved nutrition. June 12, 2017.
[13] National Institute of Statistics of Rwanda (2018). Agricultural Household Survey, 2017 report

#	Indicator	Baseline Value	Findings/Context
2	Percent of children 6-23 months receiving a minimum acceptable diet (MAD)	16.6%	FTF Rwanda ZOI Interim Report (2016): 16.5% Hinga Weze Baseline (2018): 16.6% (18.8% male; 11% female) CSFVA (2018): 17% Nationally (no disaggregation by district level) The baseline value is set using Hinga Weze's findings given it is the most recent and its sample frame most closely resembles the Orora Wihaze target area. According to the FTF Rwanda ZOI Interim Report, consumption of flesh foods and eggs for breastfed children 6-23 months in the ZOI districts was 15.3 and 3.4 percent; for non-breastfed it was 24.6 and 7.3 percent, respectively. Of all the food groups, eggs had the lowest consumption, which is even more concerning given that rural households mentioned eggs and small fish as being the most accessible ASF in our current study.
3	Percent of women of reproductive age (15-49) consuming a diet of minimum diversity	17.1%	FTF Rwanda ZOI Interim Report (2016): 37.5%[14] Hinga Weze Baseline (2018): 17.1% (based on 9 food groups) CSFVA (2018): This study only calculated dietary diversity for household level and children below 2 years, and is not appropriate for this indicator. The baseline value is set using Hinga Weze's findings given it is the most recent and its sample frame most closely resembles the Orora Wihaze target area. According to the FTF Rwanda ZOI Interim Report, Consumption of meat and organ meats and eggs for those achieving dietary diversity was 41.6 and 4.7 percent; for those not achieving dietary diversity it is 6.8 and 0.3 percent respectively. Of all the food groups, eggs had the lowest consumption, which is even more concerning given that rural households mentioned eggs and small fish as being the most accessible ASF in our current study.
4	Percent of female participants of USG nutrition-sensitive agriculture activities consuming a diet of minimum diversity	17.1% (note only for ages 15-49)	Since all Orora Wihaze participants are meant to have connection with the project's explicit consumption / diet quality outcomes, this indicator broadens the focus to include women of all ages (below 15 and over 49) that participate in the project. The secondary data cited above only surveys women of reproductive ages 15-49, making this an imperfect baseline value.
5	Observed shifts in trust and cooperation between smallholder producers and other market actors (Market System Indicator)	Cooperation=1.25 Trust=1.42	Cooperation is moderately low, as customer centricity is not prioritized and rewards for brand loyalty are limited. Relationships are not strongly maintained and subject to price and profit volatility. Cooperation requires trust and also reinforces it. Trust, while slighter higher is also moderately low, in terms of expectations of quality of services and products in the market system, the prevalence of fraud, and the common inability, especially of smallholders of livestock, to follow through on commitments, especially with payment. Due to the relational nature of this indicator, measuring it is susceptible to selection, affect, and question bias, which will take conscious effort to address and minimize.

[14] Feed the Future (2016). Feed the Future Rwanda 2014-2015 ZOI Interim Assessment Report. Rockville, MD: Westat.

#	Indicator	Baseline Value	Findings/Context
6	Value of new USG commitment and private sector investment leveraged by USG to support food security and nutrition	$0	In 2019, USG foreign assistance disbursements to Rwanda for agriculture were $20 million and for maternal and child health were $19 million (Foreign Aid Explorer, 2020).[15] These included investments in Feed the Future Rwanda Hinga Weze and PSDAG, amongst others. PSDAG, which was a $25 million activity, leveraged $29 million of new private sector capital investment in the ag sector or food chains (beans, Irish potatoes, maize, horticulture, dairy, and others).[16] As Orora Wihaze is a market systems activity, leveraging capital and co-investments from partners across the four ASF value chains is a key indicator of successful partner engagement.
7	Value of annual sales of producers and firms receiving USG assistance	USD $149 average annual sales of Rwandan livestock farmers; USD $19,265 average annual sales of Orora Wihaze partner firms	The value of annual sales per livestock producer will be determined on a rolling basis. Preliminary research indicates the value of annual sales from pigs is USD $1,249/ household, from chicken (including local breed bird meat and egg sales) is USD$ 84/ household, from goats is USD $40/household, from fish is USD $660/ household. If the reach of Orora Wihaze is 160,000 households then the annual sales are roughly USD$62.5mn, with annual sales averaging around USD$390/livestock type reared/ household. The value of annual sales per partner firm will be determined on a rolling basis as well. Partners are expected to range from large food processing companies - like Inyange Industries, with annual sales around USD$10mn[17] - to smaller SMEs with annual sales of USD$54,000 or less.[18]
8	Yield of targeted agricultural commodities among program participants with USG assistance	Meat: 7.7 KG/animal in herd or flock Egg: 217 eggs/hen	The yield per producer in the target districts will be determined on a rolling basis. Preliminary research indicates that each mature hen of indigenous chicken weighs between 0.8 to 1.8 kg and produces an average of 40 to 100 eggs per year.[19] The average pig weighs 78 kg.[20] Fish yield is 400 kg on average.[21] The mean live weight of goats is 13.1 kg/kids, 25.5/young and 33.3 kg for mature goats.[22] Lack of productivity in ASF production is a key constraint that Orora Wihaze is aiming to address.

[15] USAID (2020). Foreign Aid Explorer.
[16] USAID (2019). Rwanda Private Sector Driven Agricultural Growth (PSDAG) Project - Final Report.
[17] Sachin Gathani and Dimitri Stoelinga (2013). Understanding Rwanda's Agribusiness and Manufacturing Sectors. International Growth Center, London.
[18] The MINICOM defines any enterprise with less than 100 employees, an annual turnover below 50 million Rwf (ca. $54k) and a net investment capital below 75 million Rwf (ca. $80k) as an SME. The SME sector (formal and informal) comprises 98% of businesses in Rwanda and 41% of private sector employment. See: MINICOM, SME Product Clusters in Rwanda.
[19] Habimana R, Okeno TO, Ngeno K, Mboumba S, Assami P, Gbotto AA, et al. (2020). Genetic diversity and population structure of indigenous chicken in Rwanda using microsatellite markers.
[20] Francis Mbuza et al. (2016). Inventory of pig production systems in Rwanda. International Journal of Livestock Production, Vol. 7(7), pp. 41-47, July 2016.
[21] Ministry of Agriculture and Animal Resources (year). Master Plan for Fisheries and Fish Farming In Rwanda.
[22] Manzi, Maximillian & Rutagwenda, M1* & N, T2 & Chatikobo, Paul. (2011). Phenotypic Characterization of Goats Raised under Traditional Husbandry Systems in Bugesera and Nyagatare Districts of Rwanda. Journal of Animal and Veterinary Advances 10 (24).

#	Indicator	Baseline Value	Findings/Context
9	Number of individuals in the agricultural system who have applied improved management practices or technologies with USG assistance	0	Research into the pig production system highlights that most farmers (66.8%) reported lack of affordable quality feeds, followed by lack of breeding stock (43.5%), disease control (38.2%), marketing (37.4%) and availability of credit (26.9%). Farm records were rarely (38%) kept.[23] These numbers are mirrored by more recent data from Vanguard (2019), in which feed (100%) and credit (85%) were top constraints for poultry farmers, while disease control (85%) came second to feed for pig farmers.[24] Feed supply, in particular forage and fodder for ruminant livestock and grains and oil seeds for chicken and pigs, is foreseen by the Rwanda Livestock Master Plan to be the main physical constraint to expanding the livestock production.[25] There are limited cold facilities for processing meat and thus options for distribution of prepared meat are limited, and live animal trade remains predominant.[26] MINAGRI's Strategic and Investment Plan to Strengthen the Meat Industry in Rwanda points out the issues with hygiene of slaughter, transport, and sale of meat.[27] Given the low level of meat consumption currently, sanitary conditions as well as contamination and adulteration are risks that will have to be addressed in the future as the meat industry grows, but are of lower priority at the moment. The regulation of the veterinary drug industry is the responsibility of RAB, but its capacity to monitor and regulate veterinary pharmacies is limited, and it currently does not have the resources (financial and human) or facilities to test the drugs on the market (World Bank, 2015). The indicator tracks those individuals who are changing their behavior while participating in Orora Wihaze. Individuals who attended training or were exposed to a new technology do not count unless they actually apply what they learned.
10	Value of agriculture-related financing accessed as a result of USG assistance	$0	The USAID funded PSDAG program worked with four Financial Service Providers to develop new products tailored to agriculture. One increased agri-lending from 22% of their portfolio to 32%, and another from 14% to 24%; both attribute increases to PSD AG. During that program, 70,000 firms and farmers accessed more than $26M in lending, including 65,958 individual farmers or micro-enterprises, 4,362 small enterprises, and 212 medium enterprises.[28] As access to credit is a key constraint highlighted by farmers (see previous indicator), seeing novel financing mechanisms developed with partners will likely be an important measure of success.

[23] Francis Mbuza et al. (2016). Inventory of pig production systems in Rwanda. International Journal of Livestock Production, Vol. 7(7), pp. 41-47, July 2016.
[24] Vanguard Economics (2019). Assessing the Market for Rwandan Poultry, Pig and Animal Feeds Products. August 2019.
[25] International Livestock Research Institute (2017). Rwanda Livestock Master Plan.
[26] Elizabeth Rogers Consulting for GAIN (2016). The Marketplace for Nutritious Foods. Rwanda Landscape Report.
[27] The World Bank (2015). Rwanda Agricultural Sector Risk Assessment. Washington, DC, October 2015.
[28] USAID (2019). Rwanda Private Sector Driven Agricultural Growth (PSDAG) Project - Final Report.

#	Indicator	Baseline Value	Findings/Context
11	Milestones in improved institutional architecture for food security policy achieved with USG support	N/A	The policy priorities will be determined during implementation. The review of the existing policy documents shows that Rwanda has committed to the formulation of a food security strategy in line with the country's national, regional and international development frameworks. These include the Vision 2020, Economic Development and Poverty Reduction Strategy (EDPRS), National Strategy for Transformation (NST1), National Agricultural Policy (NAP), Strategic Plan for Agriculture Transformation (PSTA4), Comprehensive Africa Agriculture Development Program (CAADP) Compact, and Millennium Development Goals (MDGs). A number of policies, strategies and programmes are in place to address goals to eliminate hunger, improve food security and reduce poverty among Rwandans. In addition, these national, regional and international development frameworks guide the agriculture and food security policy process. There are management and coordination mechanisms governing the identification and prioritization of the policy change. Some of these mechanisms include the Agriculture Sector Working Group (ASWG), Sector Wide Approach (SWAP), Joint Action Development Forum, technical sub-group committees, and other platforms at decentralized line units.[29] Addtionally, there is recognition of the importance of the Cluster Framework (social, Economic and Governance Clusters), Joint Action Development Forum (at decentralized level), and the National Leadership Retreat (NLR) and National Dialogue (Umushyikirano) Council (NUC), which are high level coordination mechanisms given much priority in all sectors planning processes. Considering the already quite complex institutional set-up, developing clearer delineations of responsibility and oversight will likely be a key aspect.
12	Average business model innovation score (Market system indicator)	0.25	The average BII is 0.25 on a scale of 0 to 1. The score for youth is 0.31 and women is 0.2.
13	Number of children 6-23 month benefiting from USG assistance consuming ASF in the previous day and night	0	
14	Number of women of reproductive age benefiting from USG assistance consuming ASF in the previous day and night	0	

[29] Africa Leadership Training and Capacity Building Program for USAID (2014). Institutional Architecture for Food Security Policy Change: Rwanda, January 2014.

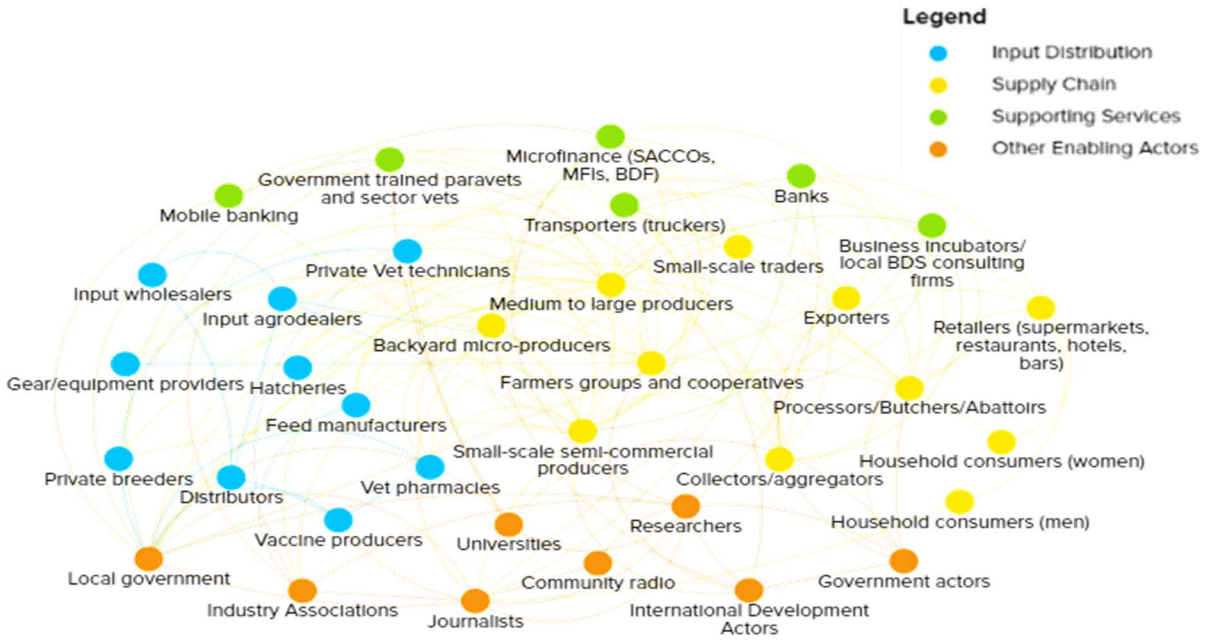
#	Indicator	Baseline Value	Findings/Context
15	Percentage increase in quantity of ASF nutrient rich commodities produced by direct beneficiaries with USG assistance that is set aside for consumption	0%	Traditional farmers produce most of the meat available in the country; they keep a small number of animals at their households and sell to nearby small markets. The preliminary research conducted for this study indicates the per capita meat consumption for the people of Rwanda was only 7.9 kg/year for meat, 59 liters/year for milk and 0.63 kg per year for eggs (MINAGRI/RAB 2015). As mentioned in the Livestock Master Plan.[30] These values are far below the FAO nutritionally recommended level of consumption of ASF. Vanguard (2019) found that lower income was associated with higher pork and lower chicken consumption. The consumption study will shine more light on these patterns.
16	Observed shift in ecological factors related to food intake (Market system indicator)	Overall mean=1.21 Individual=1.08 Interpersonal=1.11 Institutional=1.31	There is a moderate degree of ecological factors on the consumption of ASF observed currently. Shifts in factors, over time, will be important to identify and investigate further. The consumption study will investigate key factors in behavioral pathways for WRA and CU2 in target areas more specifically with a different methodology.
17	Number of individuals participating in USG food security programs	0	The current populations of the targeted districts for Orora Wihaze total around 2.7 million people or roughly 600,000 households. Orora Wihaze expects to reach more than 25 percent of them.
18	Percentage of female participants in USG-assisted programs designed to increase access to productive economic resources	0%	The percentage of women that report involvement in livestock raising in the ZOI is 66.4.[31] Among them, the economic activity with the lowest participation of women is fishing or fishpond culture, with only 0.3 percent. For the women involved in livestock raising, 94.4 percent report having input into decisions.
19	Percentage of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29)	0%	Youth aged 15 to 29 represent nearly 27 percent of the population.[32]

3.2. Cooperation and Trust

Expectations between producers and other market actors about how to exchange information, financing, goods, and services affect market system dynamics and relationships. Orora Wihaze intends to promote change by working with several types of interconnected actors in the agricultural market system (as seen below).

[30] International Livestock Research Institute (2017). Rwanda Livestock Master Plan.
[31] Feed the Future (2016). Feed the Future Rwanda 2014-2015 ZOI Interim Assessment Report. Rockville, MD: Westat, pp. 41/42
[32] ibid., p.5

Figure 2: ASF Market System in Rwanda[33]



This section specifically addresses how and when actors expect to cooperate and trust one another in the ASF market system. The evaluation team used thematic framework analysis and coded qualitative data according to the established index dimensions for both cooperation and trust. Evaluators interpreted the coded summaries by the established assessment criteria for each dimension and ranked responses using the scale (Figure 3) below. In the following subsections, we present the mean scores for cooperation and trust as well as associated descriptive findings.

Figure 3: Evaluation 0 – 3 Coding Scale

0	1	2	3
Reference group does not expect this to be true	It would not be entirely unexpected if this were true	It is most appropriate if this is true	This is fully expected, and there are major consequences for market actors who defy expectations

Cooperation

The degree of cooperation in a market system indicates the willingness of actors (individuals and groups) to invest their time in working with others for mutual benefit. This baseline evaluation considers two specific dimensions of cooperation – belief in the importance of ongoing relationships and belief in mutually beneficial purpose. Cooperation is scored according to expectations by providers and consumers, rather than on the act of cooperating itself.

Belief in the importance of relationships was scored a 1.5 on a scale of 0 to 3. Belief in importance of relationships manifests itself in two ways—long-term customer orientation from the supplier's end and brand loyalty from the customer's end.

[33] From the Orora Wihaze MEL Plan.

In the input distribution function of the market system, customer orientation is not always expected. While input providers noted that customer relationship management may improve business orientation towards customer needs, it is not always practical to develop, maintain, and utilize records and feedback from customers. While it could be useful to have better information on the volume and characteristics of customers, this requires resources and investment beyond the current reach of many input providers. Many agro-dealers and wholesalers have hundreds of customers and have not established systems to track and segment them, without any commonly acknowledged disadvantage to their business operations.

Figure 4: Agro-dealer and Pharmacy

In the supply chain management functions of the market system, belief on the importance of relationships is also moderately low. Many output traders, processors, and retailers expect that smallholder livestock producers have some knowledge of their expectations in terms of the size, weight, health of their animals. However, the consequences for not meeting expectations vary by value chain. For example, pigs and goats are often bought in spot markets or one-time transactions with individuals and therefore expectations of loyalty from output traders, processers and retailers are low. These producers are also not expected to track their buyers and maintain records on their expectations, standards, or pricing. In contrast, with fish and eggs, there may be more expectations in terms of effort that sellers are expected to make for their customers. For example, live fish are expected to be replaced if unhealthy in an aquarium, according to an output retailer in Kigali. Similarly, egg collectors expect their providers to produce per set quantity and quality standards (fertilized or not) before purchase, even making efforts to visit the producers to ensure the success of the deal. However, this belief in the importance of relationships does vary. One trader who only buys fish from two cooperatives noted that "production has reduced dramatically, and we don't know why", apparently making no effort from either side to communicate or research further.

Belief in mutually beneficial gains—when consumers and providers expect their interests are aligned—had an average score of 1. Beyond this extension of short-term credit, there is little evidence of belief in mutually beneficial gains by taking on the risk of a partnership. Generally, there is an expectation that there is a mutual benefit in extending short term credit, like between pig producers and butchers, where the terms are set so "the money is paid back as soon as possible (like within two days) and no interest rates are charged." Butchers in Rutsiro emphasized, for example, that there is no need to set criteria to determine with whom to work or formalize partnerships with suppliers. Similarly, support services offered by formal transporters, banks, or other business providers are not commonly expected to tailor their offerings towards livestock sector.

Figure 5. Pig and Goat Collector

Cooperation is scored overall, with an average score of 1.25 of 3 which is considered as a medium degree of expectation of agents to value a relationship and work together for mutual benefit. Informal short-term credit is often used and does build a potential foundation for cooperation. However, many transactions take place through spot markets where there are no expectations of major consequences for not cooperating. Relationships were not considered on the whole to be predatory, per se, although there was some reference to agreements to overlook some compliance standards in meat inspection processes.

Trust

The degree of trust in a market system is important because it signifies a willingness to take on risk and be confident that any short-term inequities encountered with a business partner can be resolved. To aid our understanding of trust, we explore three specific dimensions of trust – integrity, competence, and reliability – assessing levels of expectation of trust from 0 to 3 (low to high). Trust is scored according to expectations of buyers and sellers, rather than the act of trusting itself.

Integrity—the expectation that a provider or consumer will be fair or just in dealings—had an average score of 1.67. In the ASF market system, there is variation on what constitutes a fair transaction. References to fair market prices was made by policymakers, who stated that the government establishes the market price for veterinary services; by producers, who stated that large supplier companies or specific marketplaces set the market prices; by retailers, who stated that market prices are a function of comparison with competitor market prices; and by many others who stressed that the cost of production, including transportation, and taxes determine the market price. Still others stated that ability to pay, in terms of financial means, should determine what is fair in a relationship with a farmer—"if you are wealthy, you give me enough money, if you have low income, I give you a discount." Prices are discussed further in the 'Market linkages' section.

While actors expect fair treatment in dealings, they also are resigned to the fact that some will likely take advantage of others, especially given the lack of a major consequences. For example, many view contracts between buyers and sellers as unnecessary for another actor to comply with fair terms. Output traders, processors, input providers and vets tend to expect more on-the-spot dealings, generally in cash. However, several references to fraudulent behavior by producers, consumers, and vets were made, ranging from concerns over counterfeit products to predatory pricing for veterinary services. Contracts are discussed further in the 'Market linkages' section.

Competence—the expectation that a provider or consumer can do what they say—had an average score of 0.83. Consumers do not expect that providers have the competence to meet or exceed quality standards in products or services at price points that consumers can afford. There is a concern that feed quality expectations cannot be met nor ensured everywhere and that, while there are some manufacturers well known for good quality, it is advisable to compare the quality of feeds from different companies. Some producers alleged that feed vendors are actually milling residues from milled grains like maize, sorghum and cassava. In the input distribution network, in particular, there are quality standards in terms of medicines and breeds of chicks (resistant to diseases) that are expected to be met. However, veterinary service providers, who are skilled and charge a price that a small producer can afford, are scarce. In the supply chain management functions of the system, some buyers consult with information providers (*Abasheretsi/abakatuzi*), also called "brokers," who screen and provide information on the quality of livestock from suppliers. These brokers are particularly useful for buyers of pig to understand the health status of the animals in terms of age and weight.

Reliability—the expectation that a provider or consumer will do what they say—had an average score of 1.46. Many dealings are made based on extension of informal credit with the expectation that not all borrowers will follow through reliably on delivery of goods or payment. Over time, relationships may grow with repeat customers and prove valuable in strengthening reliability. Nevertheless, it is common for those that extend credit, like a vet in Eastern province stressed, to not be paid or to be paid without respect for deadlines. The only consequence for a delinquent recipient of informal credit is that they cannot continue to do business with the business they owe money to. Value chain credit is discussed further in the 'Market linkages' section.

Gender plays a role in cooperation and trust between actors. While consideration of gender is discussed further in the "Inclusive Value Creation" section on women, a government researcher made a relevant cross cutting statement in terms of normative expectations on cooperation and trust:

> *"The level of trust and cooperation among women is higher compared to that of men...There are huge opportunities in developing research solutions meant for these categories of people; these include the trust and cooperation with these groups are higher and the adoption of new small livestock technologies developed is quickly achieved. The challenges arise when some research solutions are not cost-effective require their small financial contributions which they mostly do not have. In addition, their entrepreneurship skills remain a challenge."*

Overall trust was given an average score of 1.42 of 3, which reflects a medium degree of expectation that market system actors will be willing to take a risk and confidently rely on partnerships. Relationships were not considered on the whole to be predatory, but they were not stable partnerships either.

Figure 6 on the next page provides a summary view of the sheep market.

Figure 6: Sheep Market Linkages Snapshot

Sheep market linkages snapshot – Northern Province

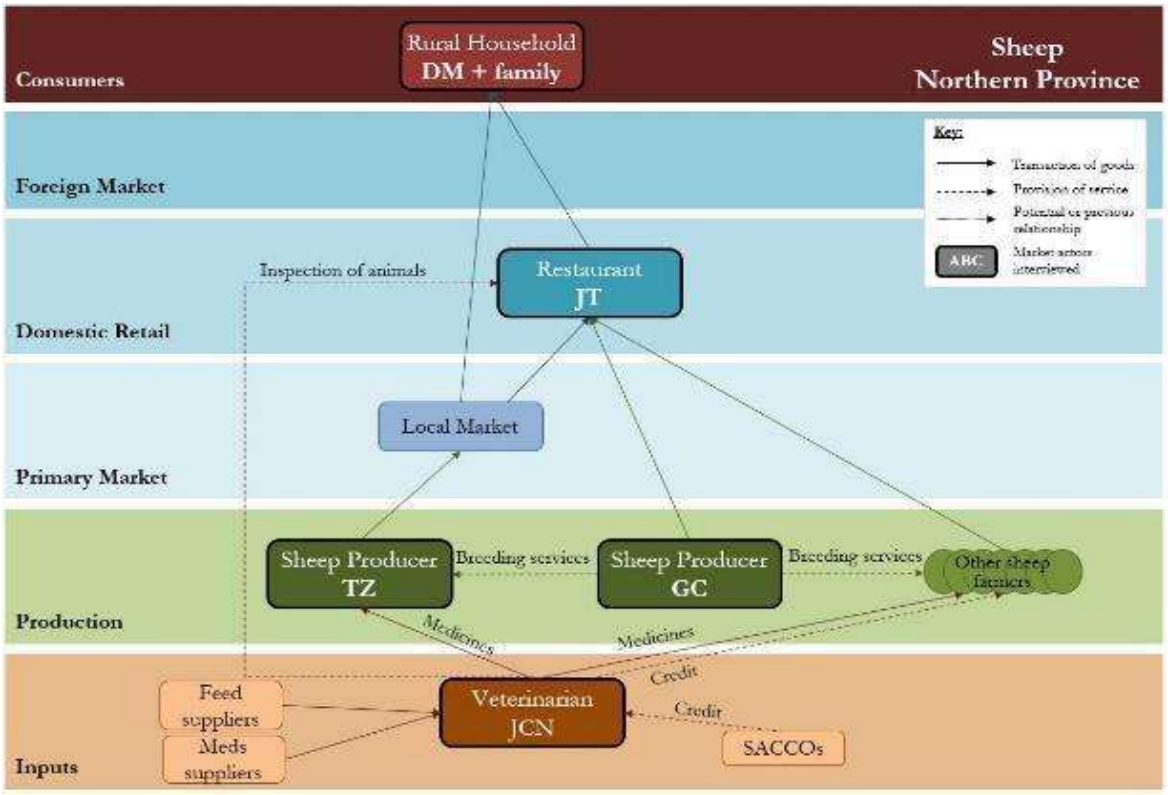
Sheep producer - TZ has a small farm with six sheep, two chickens and one pig. She sells an animal when her household has a financial problem. Last year, she sold just one sheep and sold it at the market. She buys deworming medicine from a vet nearby named JCN.

Veterinarian - JCN is a young vet who has been in business since 2016. He diagnoses and treats diseases and sells medicines and sometimes poultry feed. He purchases from three suppliers and has about 1,000 customers. While he sometimes offers his customers his services or products on credit, he does not receive credit from his suppliers. He took a loan from SACCO, but it was not as much as he needed since he did not have adequate collateral.

Breeder - *TZ* uses a nearby farmer to breed her sheep. GC has one male sheep (and one pig) and had about 70 customers for his sheep breading services last year. He provides this service at the same fixed price for all customers.

Restaurant - JT runs a restaurant selling drinks and food, including sheep, poultry and swine. He has had his restaurant for 15 years. He purchases directly from producers and had about 100 total suppliers last year, including about 50 for sheep. The only criteria he uses for choosing whom to purchase from is low price. Since there are no large producers available nearby, he prefers not to have contracts with his suppliers. He says the veterinarian inspects his sheep and pigs before slaughter but not the chickens, so he is less sure about their safety.

Consumer - One of JTs customers is DM. He says in his household they eat ASF two or three times per week. He often eats ASF outside his household because when he does, he does not have to buy it for his whole family. Nevertheless, he finds ASF relatively expensive. He trusts the safety of ASF because he knows a vet inspects it.



3.3. Business Innovation Index

This subsection responds to evaluation question 2 by summarizing findings on the business innovations index for the ASF market system. These results are a benchmark against which improvements in level of innovation in the market system can be compared. Innovations are defined as improvements made by a business or organization in the last six months. Innovations do not need to be novel to the market system, only to the business or organization adopting them. In total, 15 innovation types are used to create the BII.[35] These are shown in Figure 7 below.

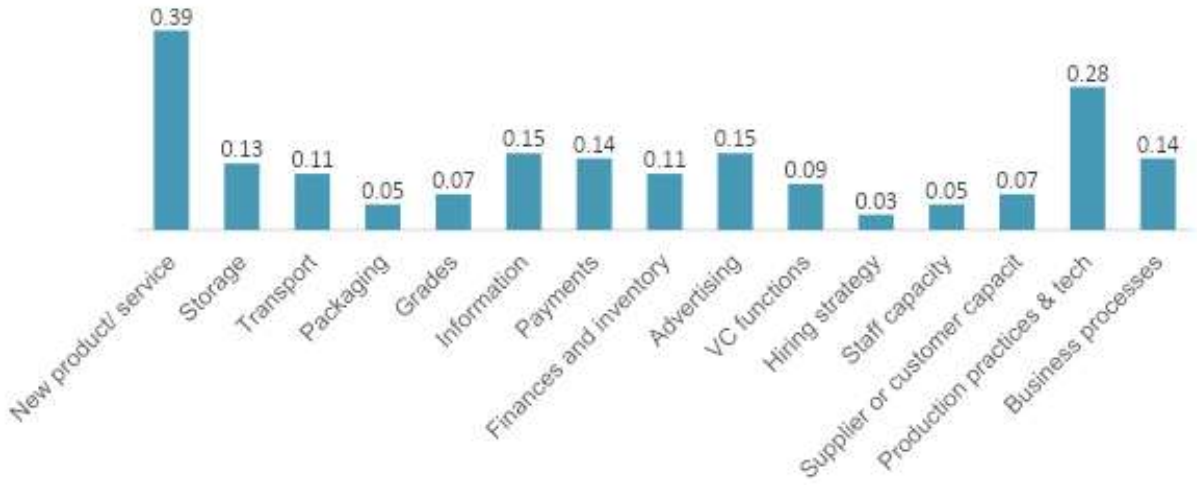
Tables 4 and 5 present mean and median BII scores. BII scores are calculated by multiplying respondent's total number of innovations in the last six months by 0.2 up to a maximum of five innovations (the highest possible score is 1.00). The mean BII score across all respondents is 0.276. with a median value of 0.2.

Table 4: Mean actor BII scores by market function

All (n = 244)	.25 (.2)
Market function	
Supply (n = 128)	.182 (.2)
Producers (n = 56)[34]	.138 (.1)
Non-producers (n=72)	.217 (.2)
Input (n = 72)	.347 (.3)
Support (n = 13)	.323 (.4)
Enabling (n = 31)	.277 (.2)

ASF market system actors involved in the supply market system function have the lowest BII at .182. The classification of respondent types by market system function is found in Table 1. Producers (including cooperatives and producer groups), have an even lower BII at .138 while the rest of the actors involved in supply (e.g. traders, butchers, and retailers) have a mean BII of .217. The input function actors have a BII of nearly twice that of supply actors at .347. Support services and enabling environment actors, of which there are far fewer, have BIIs of .323 and .277 respectively.

Figure 7: Share of respondents reporting each BII innovation type (n = 244)[36]



[34] Producers were only asked about three possible innovation types.

[35] As noted in the methodology sections, 13 types in the typical metric, and 2 additional types added for producers, producer organizations and cooperatives.

[36] Note that production practices & tech and Business processes were only answered by producers, producer organizations and cooperatives.

Since that that the BII is driven largely by new product and service offerings (Figure 7 above), it might be expected that the BII is significantly higher for input than supply function actors purely due to the wider range of new input products created by manufacturers in Rwanda and around the world than output products likely to be created from the four livestock types. However, even after removing the new products innovation from the BII, input actors still have a significantly higher BII than supply actors at .256 compared to .136. Regardless of new product and service offerings, input actors were more innovative than supply actors.

Women in the ASF market system have lower BII scores than men at .202 compared to .265. These results are shown in Table 5. One possible explanation could be constraints in accessing capital, which interviewees indicated was a main barrier to female-owned businesses. . On the other hand, youth (people under 30) have a significantly higher BII score than those 30 and up at .317 compared to .203. This is also consistent with interviews in which people said that youth were more willing to try new things.

Table 5: Mean BII scores by demographics and value chain

Mean BII score (median)	
All (n = 244)	.25 (.2)
Demographics	
Women (n = 60)	.202 (.2)
Men (n = 181)	.265 (.2)
<30 years old (n = 41)	.317 (.4)
>29 years old (n =147)	.203 (.2)
Value chains	
Poultry (n = 132)	.308 (.2)
Swine (n = 115)	.292 (.2)
Shoats (n = 98)	.283 (.2)
Fish (n = 64)	.233 (.2)
Participation in multiple value chains	
In four value chains	.375 (.4)
In three value chains	.345 (.2)
In two value chains	.253 (.2)
In one value chain	.165 (.1)

Disaggregation of BII scores by value chain participation shows that those in poultry have the highest scores and those in fish the lowest. The low score for fish value chain participants is consistent with findings that fish pond producers often lack business orientation. Note that simply by eyeballing the four BII scores for the four value chains one can observe that the average across all value chains is greater than the average for all respondents in the first row, (.25). This is because many of the most innovative businesses work across multiple value chains and therefore are "double counted". This finding is illustrated in the last four rows where those participating in all four value chains have a BII of .375 compared to .165 for those only participating in one value chain. Intuitively, more entrepreneurial and innovative actors are able to expand and work across multiple value chains. Furthermore, by working across multiple value chains, they may be able to diversify their risks and take more chances on innovations.

Figure 8: Butcher Weighing Meat

New products or services were overwhelmingly the most common innovation with 39 percent of respondents offering a new product or service in the last six months. This is shown in Figure 7 above. Examples of new products and services offered in the last six months include:

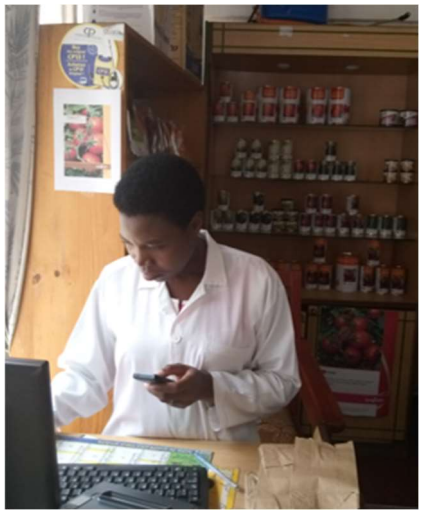
- A producer has begun to sell chickens after previously raising them for home consumption.
- A butcher is now offering smaller pieces of meat for increased affordability.
- A retail store beginning to sell pig lard for cooking.

- A supermarket is now selling tilapia (but say it is too expensive for their customers)
- A veterinarian is now offering access to a new application called igrowchicken.
- An input wholesaler is now offering enzymes for animal nutrient absorption
- A veterinarian is now offering cesarean services for pigs.
- An MFI has released a loan product with lower interest rates

The next most common innovation is in production practices and technologies. Twenty-eight percent of producers, producer organizations and cooperatives made innovations in this area. Examples include:

- A large pig producer reducing their pig feeding from twice to once a day to save labor.
- A cooperative changing its fish feed based on advice of a veterinarian.
- A poultry producer introducing vitamins.
- Construction of a new pig shed.

Figure 9: Using Smartphones and Mobile Money for Innovation



Other relatively common innovations were how business collected information about their market, advertising, how they tracked finances and inventory, how they accepted payments, and storage. Below are examples of each:

- An egg and fish retailer at a stall in a market signed up to a WhatsApp group to share market information.
- A poultry hatchery created a YouTube channel to advertise their business.
- A veterinarian began tracking his debt and credit outstanding.
- A restaurant started to accept mobile money.
- A veterinarian has begun to store medicine in a cool box rather than a normal bag.

3.4. Inclusive value creation

This subsection responds to evaluation question 3 but does not produce an indicator. Instead it identifies general market system findings related to expectations of inclusiveness for women, youth and PWDs. Note that Orora Wihaze will also produce a full inclusiveness study.

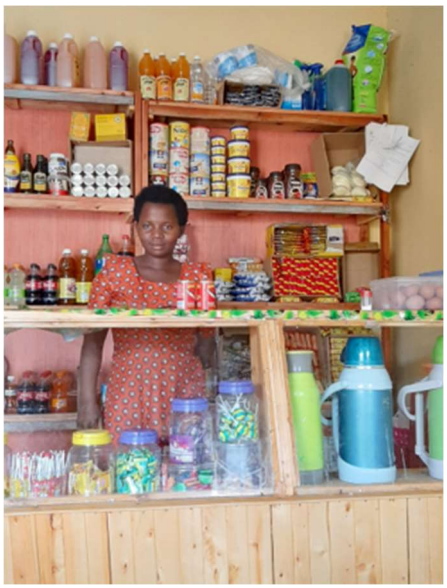
Women

In the backyard producer respondent category, women are seen as primarily involved in looking after smaller livestock, such as poultry and goats. Some input suppliers, such as a private veterinarian in Ngoma, commented that since women care for backyard animals, that they are more aware of their health status and vulnerability to diseases. However, often decisions around the purchase of veterinary services and animal drugs are made by the man in the household.

Different jobs in the ASF market system are perceived as more or less suitable for women. Some interviewees commented that women tend to be more aware of animal hygiene needs than men, such as a fish hatchery in Rutsiro. A Nyamagabe abattoir regretted that although women are generally better than men at managing

hygiene, hardly do any work in slaughtering services. On the other hand, working in livestock, and especially in swine production or in larger farms is seen as a physically demanding job that women are not always suited to work in. This was noted by several producers interviewed, who commented that working with women is less preferable than with men or young people.

Figure 10: Woman Running a Small Retail Store Selling Eggs



Most of the agro-dealers and input suppliers interviewed noted that they reach all clients, including women, without discrimination. They do not have any particular strategies in place to target women more proactively as customers and are generally satisfied about their interactions with them. However, although women producers can be a strong client base for agro-dealers, selling to them can sometimes be a risk because of their inability to pay. Two private vets, one from Nyamasheke and one from Rutsiro, commented that it is common for women to not have the money to pay for their services. The vet from Rutsiro said:

> "*We face challenges when working with these categories of people [referring to women] because they don't have money to pay for our services. But sometimes it can be an opportunity because they are many, and they are the ones who call several times.*"

Youth

Young people are valued for their motivation, dynamism and physical strength. Many respondents, including input retailers, veterinarians, medium-sized producers, across all value chains, have agreed that these are the primary benefits of working with youth. Youths' flexibility, availability and innovativeness were also noted by several employers as key strengths. Some respondents also noted youth have ambition and drive to grow professionally. In general, many respondents did not see any challenges to working with youth.

Some did find challenges in working with youth, most commonly their general lack of skills. This was reported by a variety of respondents. Additionally, several commented that young people are not reliable, tend to be distracted on the job and can be untrustworthy.

Limited financial capabilities were noted as one of the main barriers for young people and women in starting or growing a business. According to one vet in Kigali: "Youth and women are encouraged to get involved due to supporting government policies. However, the major challenge is start-up capital and land."

Selling boiled eggs is seen as an easy entry points for young people to start to earn money in the ASF market. Selling boiled eggs as snacks involves low startup and operational costs, a flexible schedule and has been in high demand. However, the high cost of feeds has been dampening that demand, as described in the 'Market linkages' section.

People with disabilities

The physical requirements of livestock production are seen as a significant obstacle for PWDs. The challenges to working in livestock noted are the need to carry heavy weights such as feed and the animals themselves and travelling to and from the workplace.

Some respondents reflected that people with disabilities should look for jobs that are less physically demanding. Opportunities do exist in retail and one supermarket manager saw no reason not to hire PWD to work as cashiers but said he had not had any applications from PWDs.

Figure 11 page provides a summary view of the poultry market.

Figure 11: Poultry Market Linkages Snapshot

Poultry market linkages snapshot – Eastern Province

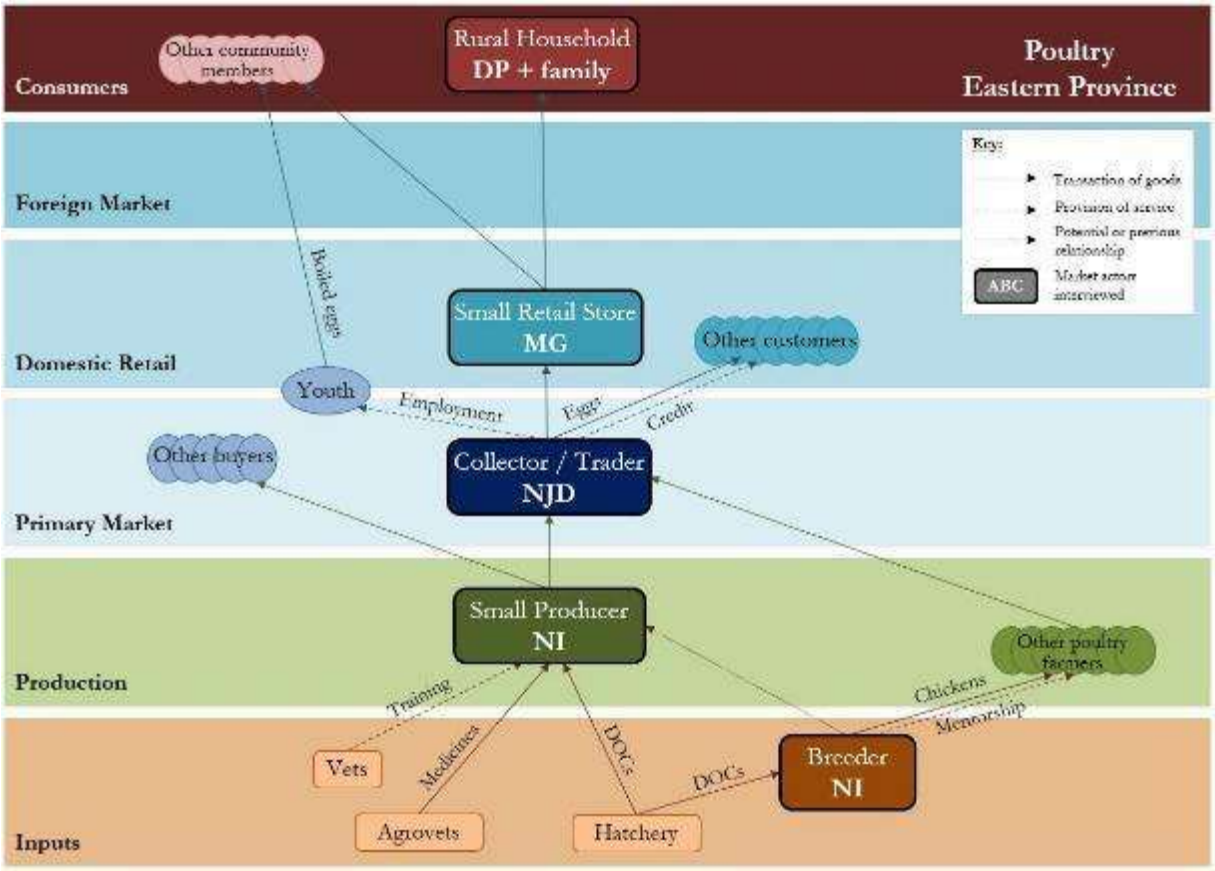
Poultry producer - NI is the manager of a large poultry farm in the Eastern province with 2,000 chickens. Because of their size, they are able to be relatively self-sufficient and hired a veterinarian to train them on detecting and preventing common problems. They have also adjusted to high feed prices by mixing their own feed. They do still buy medicines from an agrovet and chicks from the hatchery. NI sells to four buyers without any contracts, as per the preference of the buyers. He has not had any issues with this arrangement.

Breeder - NI2 sells chicks and has been in business for 7 years. NI2 himself buys day old chicks and raises them to selling age. One of his value-added services is that he provides mentorship to his clients. Recently he has expanded his business to sell medicines in addition to chicks.

Egg collector - One of NI's customers is an entrepreneurial egg collector called NJD who originally started as an egg producer. By 2016 he was not able to meet his clients' demand so he started to buy eggs from others producers. He has expanded his client base. He collects eggs every Friday from seven suppliers and sells to 8 regular customers, turning over a total of 185 trays of eggs per week. His transactions are in cash, except for with one client who deposits money in his account. NI also employees some youth to sell cooked eggs in the village.

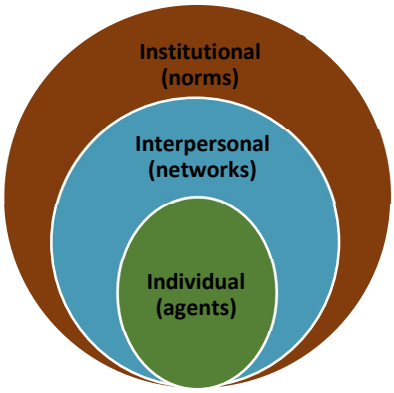
Retailer - MG owns a small retail store which sells tea, milk, eggs, bread and other products. Her children help her with the store. One of MG's five suppliers is NJD. She works with the same suppliers regularly based on the quality of their products and how reliable they are. She gets credit from some of her suppliers but does not take bank loans. One of her major challenges is the increasing price of eggs which is turning away her customers.

Consumer - One of MGs customers is DP. He says his family eats ASF, especially eggs and dried fish, about once a week. They eat beef less regularly. He regularly eats ASF when he is outside the house and also expects ASF to be served on special occasions including holidays.



3.5. Ecological factors affecting ASF consumption

Figure 12: Three levels of ecological factors affecting ASF consumption



Orora Wihaze aims to promote changes that will affect collective dietary behaviors in Rwanda, especially for the benefit of rural women and children. This market system baseline assesses the ecological factors identified by various market actors thought to influence collective patterns of food intake behaviors. A forthcoming standalone ASF consumption study will compliment this work using probability sampling techniques focusing on the dynamics within households.

A multitude of contextual factors can affect dietary behaviors. To make sense of the complex dietary behaviors within the system, the evaluation team used an ecological framework.[37] This framework, illustrated in Figure 12, considers modifiable dietary behavioral factors at the individual level, interpersonal level, and the institutional level.

In the following subsections, we present the index scores for each ecological factor (from 0 to 3) as well as descriptive findings based on the qualitative data.

Institutional

The institutional level addresses the prevalence of informal and formal rules that may influence collective dietary behaviors such as community expectations and governmental practices and regulations. It also includes market related factors. The seven factors classified under institutional are present in Table 6, along with their scores on a scale of 0 to 3.

Table 6: Institutional factors

Institutional Factor	Rating	Value
Expected availability of ASF in local restaurants/hotels	High	2.2
Expected availability of ASF in local retail (local markets, supermarkets, vendors)	Medium	1.5
Expected that dining beyond the household should include ASF	Medium	1.5
Expected that ASF is safe to consume	Medium	1.5
Presence of marketing/messaging about value of ASF	Medium	1.0
Expected to consume a portion of home produced ASF	Medium	1.0
Expected accessibility to ASF irrespective of socio-economic status	Low	0.5
Average Value	**Medium**	1.3

Consumers usually know where and what ASF should be available at local restaurants and retailers and simply cannot regularly afford it for their whole household. Consumers noted that bars and restaurants tend to have goat, pig and chicken available whereas fish are not guaranteed. In some places however, meat may be more challenging to locate, and one would have to know which specific bars and restaurants serve roast pork, for

[37] For more information on Social Ecology, start with the Wendel et al. (2015). Ecological Approaches. Oxford Bibliographies, accessed April 2020.

example. Members of lower income households are more likely to consume ASF meat when dining out without the whole family since the cost is just for the individual and not the whole family. This is especially true of male heads of household. Those who live close to lakes have increased availability and accessibility to small fish like *isambaza*.

It is widely believed that the ASF available is for the most part safe and healthy. Generally, ASF meat is considered safe if it is sold at a market or butcher where a government required inspected by a veterinarian before slaughter. Some also mentioned there is an industry S-mark from the Rwanda Standards Board (RSB) (see Figure 13) that conveys one can expect some degree of safety. However, there is some concern that an inspection by a vet before slaughter does not guarantee that hygienic measures are observed at the slaughterhouse, market, or butcher. [38] Chicken is considered safe when consumed directly after slaughter. Pork is generally not considered safe to prepare and store at home.

Figure 13: Rwandan Standards Board Industry Standardization Mark

For poultry and fish, consuming what you produce is common. However, because of their size and the requirement to have an animal inspected before slaughter, swine and shoat producers often do not consume what they produce.

There are mixed opinions on the strength of the prevalence of public messaging on the value of ASF consumption. Several mentioned that programs on the radio[39], especially in Ngoma, encourage people to consume ASF and balanced diets frequently. Additionally, messaging about ASF can be heard from community health workers, in Community Health Clubs,[40] and at health centers. There tends to be less prevalence of commercial ASF marketing, but also a commonly expressed opinion that marketing is not needed.

Interpersonal

The interpersonal level considers the expectations of the household that may influence dietary behaviors. The four interpersonal factors along with their scores are presented in Table 7.

Table 7: Interpersonal factors

Interpersonal Factor	Rating	Value
Frequency of ASF meals eaten together with household	Medium	1.4
Frequency of ASF at social gatherings	Medium	1.3
Presence of household expectations for children to consume ASF	Medium	1.0
Presence of household expectations for women to consume ASF	Low	0.8
Average Value	**Medium**	**1.1**

[38] In fact, a 2019 study found a strong distrust of butchers both in terms of hygiene and in terms of weights of meat. See Vanguard Economics (2019). Assessing the Market for Rwandan Poultry, Pig and Animal Feeds Products. August 2019.
[39] The Rwandan government rolled out the '1,000 Days for 1,000 Hills' campaign, which pushed out messages across various channels, including community radio stations, on young child feeding practices with diverse diets to include eggs, fish, meat and other dairy products, although it was unclear if this was the messaging that was being referenced. See the case study presented in UNICEF (2019). Children, Food, and Nutrition. New York, p. 77
[40] The clubs in each village include entire communities and promote a "culture of health", through promoting positive norms, increasing social capital, and alignment with cultural values. In: Ekane et al (2019). Implementation challenges for Community Health Clubs in Rwanda. Stockholm Environment Institute.

Most households do not expect to regularly consume ASF at family meals. As a consumer noted, "on ordinary days, we consume ASF sometimes… On any special day it's mandatory to consume ASF, especially meat." When the family can consume ASF, meat is considered a treat. Special occasions are commonly expected to include ASF on the menu. These special occasions include New Years, Christmas, weddings, birthday parties and other special events/days (see The New Times article link and the cover in Figure 14 below).

Figure 14: Media Story on Social Drivers of Meat Consumption


The New Times
RWANDA'S LEADING DAILY
News Opinions Sports Lifestyle TimesTV Cyamunara Jobs & Tenders Weekender
NEWS
Festive season triggers spike in meat prices
By Michel Nkurunziza Published : December 26, 2019
According to meat sellers in Kigali, the price of beef, goat's meat and mutton has increased up to four times during this festive season. Photos

ASF is not expected to be served at all social gatherings with enough quantity for all guests. While many social gatherings include some dish with ASF, commonly beef stew, there will not necessarily be enough to serve all invited guests nor the expectation that there will be enough.

Women and children are often not expected to eat ASF at a regular frequency, unless there is a specific health issue for an individual. While men tend to spend money to consume ASF at restaurants and bars, especially when going out for a beer, women do not tend to allocate money for this type of consumption. Some expressed that children should ideally consume ASF on a weekly basis, but do not have their own purchasing power and are subject to decisions made by the heads of household (sometimes the male, other times the female), who determine the family diet. Some respondents believed that ASF consumption should be in proportion with the energy requirements of household members, suggesting that working men should consume more ASF.

Individual

The individual level considers individual beliefs, knowledge and tastes that may influence dietary behaviors. The following three factors are included and scored in Table 8.

Table 8: Individual factors

Individual Factor	Rating	Value
Belief that certain conditions (age, sex, pregnancy) warrant consumption	Medium	1.5
Knowledge of ASF value for health	Medium	1.0
Taste preference for ASF	Low	0.8
Average Value	**Medium**	**1.08**

Some consumers have knowledge of a health or nutritional value to consumption of ASF. For example, hypertension, malaria, and sickness warranting blood creation were noted as motivators, while gout and old age were noted as health conditions that may dissuade consumption. The nutritional value of ASF consumption for pregnant women and malnourished or stunted children was also stressed by some respondents.

Figure 15: Small fish called Isambaza

Many mentioned the expectation that poorer individuals may only be able to access ASF options like small fish, eggs, and dairy like pouring milk into porridge. There was reference that some individuals prefer vegetarian diets. Others complained that the bones in fish make it a bit more difficult to eat. Some believe that eating too many eggs, which have become increasingly unaffordable, are actually not very healthy either. For lower income households, the consumption of ASF tends to not be daily and, if weekly, it does not necessarily include meat.

Figure 16 on the next page provides a summary view of the fish market.

Figure 16: Fish Market Linkages Snapshot

Fish market linkages snapshot – Western Province

Fish cooperative union - There is a union of fish cooperatives in Western Rwanda called XYZ. The union helps the cooperatives work together, since they fish in the same places and serve the same market. The union employs transporters to help their cooperative members bring their catch to market. They base their price on the size of their members catches. They sell their fish at the market.

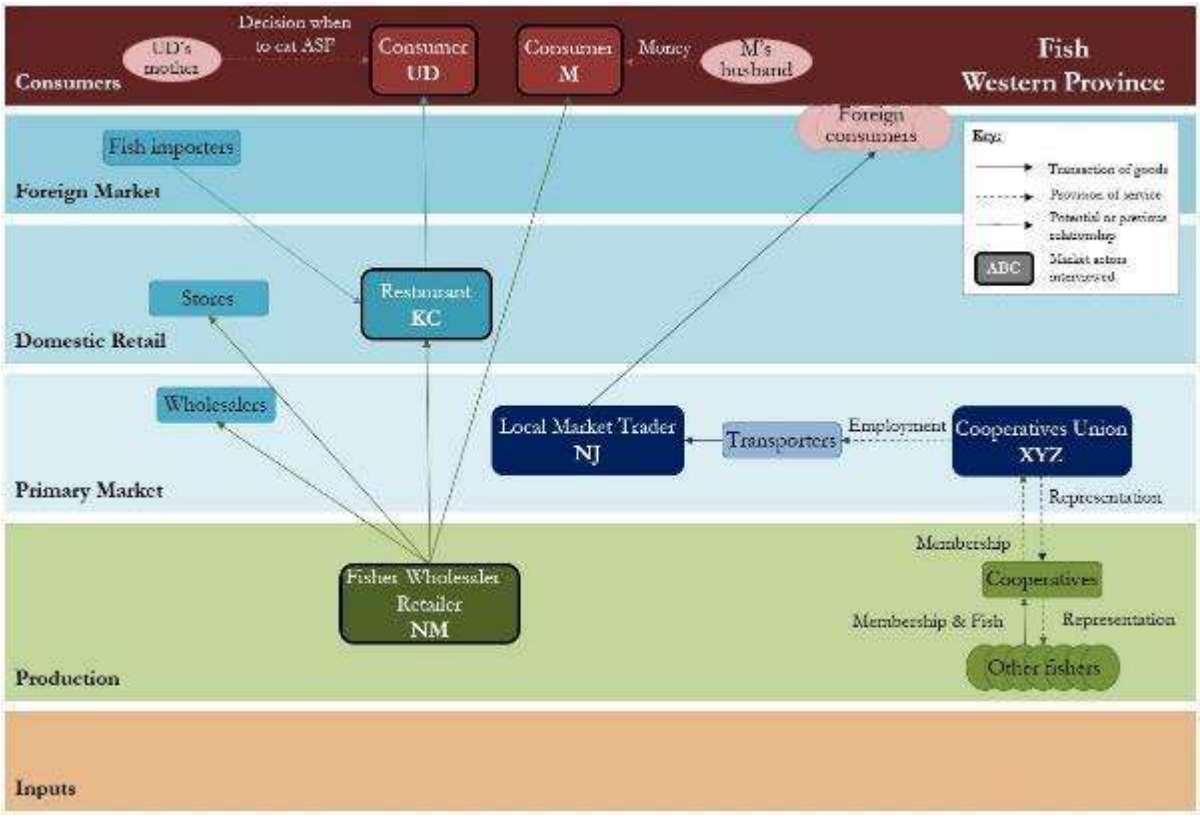
Fish exporter - One fish buyer at the market is NJ. She has only been in business for two years. She buys small fish at the market and sells it mostly to Congolese. She also notices that the price changes daily, based on the catch size.

Fisherman, wholesaler and retailer - Another nearby fish business, owned by NM, has been in business since 1996. They catch their own fish (small fish called *Indagara*) and sell them both wholesale and retail. They set their prices based on their catch plus a small tax. One of his problems is storage during rainy season.

Consumer - One of NMs customers is a young woman named M. She buys fish from NM with money her husband gives her. She says her household of four regularly consumes small fish since they are common near the lake. It is also common to eat small fish outside the home as they are readily available on the market. In order to get an idea on the safety of the fish, she observes fishermen.

Restaurant - Another of NM's customers is a restaurant that sells meat, milk, eggs and fish. The owner, KC, says that sometimes the quantity of fish from the nearby lake is not adequate and so they have to import fish.

Consumer - One customer at the restaurant is a young woman named UD. She says usually her mom decides when they will eat ASF and that they consumed it. She said in their family everyone should consume ASF about four times a week, mostly small fish but also sometimes meat.



3.6. Market linkages

This subsection responds to evaluation question 5 and examines market linkages in the ASF market system, specifically addressing contracts, finance and prices. Note that this evaluation question does not produce an indicator. It is intended instead to provide a narrative of baseline status that may initially inform the project and later be used to identify change.

Contracts

In the Rwanda ASF market system, many businesses do not have formal contracts with their suppliers or buyers. In particular smaller businesses such as producers and input or output retailers often do not have contracts and are content not to have them. Some prefer trust-based relationships built over time. These trust-based relationships can substitute directly for contracts. For example, one egg collector said that they had transaction dates, quality and transport arrangements all specified with suppliers informally in advance. A written contract is seen by some to unnecessarily complicate these types of informal relationships.

Some buyers prefer to shop around for the best deals and quality and to conduct cash-based spot transactions instead of being pre-committed to a transaction through a contract. These sentiments were expressed by output and input retailers, as well as a poultry exporter. Some producers also knew that they do not have the volume of production to make a contract sensible. Finally, some, including a large swine producer, simply do not know what contracts are for or how to use one. However, a few respondents including an output retailer and wholesaler did express desire to have contracts. They wished for contracts so they would have some recourse against disappointing quality from suppliers. This sentiment was expressed by both input and output retailers.

Market system actors with contracts tended to be larger businesses such as processors, input, exporters, output wholesalers and supermarkets, as well as cooperatives. Contracts allow them to plan their business better and to stabilize access to supply, to export or import markets, and to finance.

However, those with contracts reported some downsides. One is that in the face of increasing ASF market volatility, a contract may lock a buyer into a supplier and price that proves to be disadvantageous when there is supply shortage and prices increase. This was reported by two large ASF buyers in Kigali. In some instances, contracts may not be honored and payments delayed.

Overall, the use of contracts to link producers to profitable markets is limited. Part of this is the nature of smallholder livestock production where small volumes and irregular production often make contracts impractical. Those buying from larger producers may not want to be locked into exclusive business relationships in a volatile market. This suggests scope for improved contracts that distribute risk more equitably between the two parties. Expanding use of contracts may also have positive implications on ASF quality.

Finance

This subsection discusses value chain finance provided by one business to another in a value chain, and formal bank finance and microfinance.

Value chain credit is common throughout the ASF market system.[41] This service mostly consists of customers being able to pay later for a product or service received and is often based on trust built over the duration of a commercial relationship through many transactions. Offering credit is also sometimes an expected service from a seller. One provincial-level feed manufacturer and retailer said, "you cannot sell without providing credit."

[41] A number of those business reporting not offering credit were in Rutsiro. The Team has not been able to confirm whether this is a significant finding or a coincidence.

This finding was corroborated by a poultry producer who said they chose input providers based on whether they offered credit (and technical advice).

Value chain credit does not appear to be used to make business investments but rather to smooth over temporary cash flow shortages. Producers report being able to access credit in case of an emergency – including from a vet if their animal is very sick. Reported repayment periods vary from one day to five months, with larger businesses generally receiving longer repayment terms than smaller ones.

Value chain credit not only facilitates commercial transactions, but it is also viewed as a way to build trust-based relationships between buyer and seller. Trust, according to one egg collector, is key for sustaining a good business relationship.

In addition to relying on trust, businesses extending credit may take several measures to prevent loss. Some accept checks as guarantees of payment for larger transactions or keep detailed records of who owes them money. A business extending credit to a producer may consider whether the credit coincides with the productive period of the borrower, who is then more likely to be able to pay back. For example, a buyer may consider whether or not a seller's chickens are in laying period. These methods are not foolproof and failure to repay is a cost of doing business. The primary available recourse is simply to avoid doing business with a person who does not pay you back.

Many businesses, especially smaller ones, are reluctant to take bank loans. Typical explanations for this reluctance include high monthly interest rates of as much as 24 percent per year, prohibitive or restrictive collateral requirements, and complicated loan procedures. Because of these high interest rates, some larger businesses expressed a preference for self or shareholder financing of investments. One bank is trying to address the monthly interest payment constraint with payments customized around the productive calendar of the producer. For example, for swine producers, repayment would be due after six months when young pigs are ready for slaughter. However, the interest rate is still high at 24 percent per year.

An alternative to traditional banks is the government-run Umurenge Savings and Credit Cooperatives (SACCO) program. SACCO targets vulnerable households including those in cooperatives, with a special focus on youth and women. Loan size is capped at one million Rwandan Francs (just over 100 USD) per borrower, an amount which is only adequate for relatively small investments and not enough for one vet pharmacy. This loan ceiling is based on the borrower meeting SACCO collateral requirements, and so actual loan ceilings are often even lower. Furthermore, since cooperatives may not have cooperative owned assets, they may not be able to meet collateral requirements and therefore members may be forced to borrow individually, according to one fish trader.

For some smaller businesses, community savings and loan groups are preferred to both banks and SACCO. These informal trust-based groups in which everybody knows each other have lower interest rates, less bureaucracy and faster transactions than banks and SACCO. One private veterinarian was in three such informal community savings and loans groups. The National Union of Disability Organizations in Rwanda (NUDOR) promotes community savings and loans groups with the objective of helping PWD raise small livestock.

Risk of livestock or fish dying before a borrower can repay a loan impedes access to finance. If this happens, the borrower may be forced to default or sell other assets to repay. One fish cooperative experienced this when their fish ponds were flooded. A pig collector was initially unable to payback a loan after the pigs he bought died and ended up having to sell some of his land to meet his financial obligation.

Small livestock insurance could ameliorate this risk for lenders and borrowers and expand access to finance. However, small livestock insurance is not yet available in Rwanda, with only crop and cattle insurance currently

available. This deficiency was brought up by a number of respondents including an agrovet, exporter, veterinarian and someone in the media. The government is aware of this need. In 2019 it launched *Tekana Urishingiwe Muhinzi Mworozi*, an agricultural insurance scheme which it subsidizes at a rate of 40%. The program initially covered dairy cows in 8 districts, but the plan is to expand to 30 districts and to small livestock, especially swine and poultry, in July 2020.

In general, there appears to be a missing middle in access to finance in the ASF market system in Rwanda. Small business can access value chain credit to allow them to make purchases even when cashflow is low. They can also access informal community savings and loans groups or SACCO for small productivity investments. Larger businesses are more likely to be able to meet bank requirements if necessary or self-finance. However, mid-sized businesses appear to be left out – a familiar pattern across developing countries that has been termed the "missing middle". Community savings and loans group and SACCO financing may be too small and bank financing requirements difficult to meet, with interest rates prohibitively high. The government's planned small livestock insurance scheme may help address this gap for mid to large scale producers.

Prices

The ASF market in Rwanda is largely a sellers' market. Many producers, especially poultry producers, set their sale price based on the cost of production. One exception found was for poultry in the Northern Province where there is limited local market for eggs – here, several large exporters determine producer sales prices. The single largest determinant of cost of production is the cost of feeds. This relationship between feed and ASF product costs is so direct that one egg collector said that they monitor feed prices in order to predict egg prices. Feed prices also drive swine prices.

In animal feed manufacture, the main driver of price is maize. Maize constitutes approximately 50 percent of poultry, swine and fish feed. The type and quality of maize is the same as is used for human consumption. When there is a shortage and the price of maize increases, the price of feed and therefore the price of ASF increases. One large feed manufacturer said that currently less than 50 percent of their maize was domestically produced and most of the other feed ingredients are also imported.

Figure 17: Transporting Goats to Market

In output markets, sales price is largely driven by purchase prices. Sellers often add a fixed margin of up to 30 percent to their purchase price. Fluctuations in the cost of production are then passed on to consumers through the output market. The result is that the entire value chain is highly sensitive to feed and therefore maize prices.

Maize prices are currently at an all-time high in Rwanda in part as a result of a bad harvest.[42] The consequences are evident throughout the ASF market system. Because of expensive feeds, poultry and swine producers are reducing production or even dropping out of production altogether, especially small-scale producers. The resulting supply shortage coupled with higher cost of production is driving consumer prices beyond the reach of most poor households. One retail shop stopped stocking eggs because the price had risen beyond what their customers were willing to pay. According to one agrovet:

[42] Emmanuel Ntirenganya (2020). New maize price set as harvest starts. The New Times, February 2020.

"Before this crisis of animal feeds, in the evening, you could see that everyone in the center is eating an egg, and now is not simple to find even one egg on our local market. Most eggs producers have dropped out of that business due to lack of feeds to their poultry."

While the feed price hike has most drastically affected the poultry industry, it has also affected the swine industry. One swine producer said he had to reduce from 50 pigs to 11 as a result of the high prices of feed. High feed prices are leading some producers to make their own feed. This is discussed further in the subsequent section.

Figure 18: Livestock Feed Stores. Input Prices Strongly Affect the Livestock Industry

In response to feed price increases, some producers have taken to making their own feed. One large scale poultry producer is making feed from maize, soya, dried fish, salt and other ingredients. Another poultry cooperative as well as a poultry and swine producer group use maize, meat and dried fish as feed. A swine producer group feeds their pigs scraps from the kitchen, residuals from homemade beer, and remains of meat.[43] Other pig producers report using food scraps from a local high school, sweet or Irish potatoes, maize and rice bran and grasses, in different combinations.

There is also price volatility in the higher end Kigali meat market caused by meat shortages that do not appear to be feed-related. Instead, there simply are not enough suppliers capable of meeting the quality requirements of high-end buyers, including the need for safe and quick transport of meat. One supermarket in Kigali said they are unable to purchase the quantity of quality pork, goat or lamb that they needed (they produce their own poultry). They are vulnerable to price hikes from their suppliers because they are unable to find alternative supply when one of their suppliers increases their price. There is also volatility in prices of the small fish caught from lakes based on daily catch sizes according to fisher cooperatives and traders.

Prices do not appear to directly provide quality incentives in the ASF market in Rwanda. While buyers do often cite quality as a criterion for selecting a supplier to buy from, they do not commonly offer different prices for different quality grades. As a consequence, a producer may not get the information they need from a buyer in order to upgrade their quality and access higher value markets.

Veterinarian service prices such as for breeding and or inspecting an animal before slaughter are fixed by the Ministry of Agriculture and Animal Resources. However, these prices are said to often be in excess of what smaller scale producers can afford, and veterinarians often adjust their prices to the ability to pay of their clients. One vet said that in some cases when the producer has sick livestock but limited means to pay, he simply asks the producer to pay for the medicines but not their time.

In summary, the Rwanda ASF market is largely a sellers' market, with prices determined by cost of production. Prices are especially sensitive to the cost of feed, which at the time of this baseline was at an all-time high. As a result, ASF products, especially eggs, have been priced out of many consumers' reach, which in turn appears to have contracted production.

[43] Note that feeding untreated meat to pigs can spread African Swine Fever, *Trichinella* (roundworm) and other diseases and parasites and is banned by some governments. See USDA (2009). Swine Health Protection, Feeding of Processes Product to Swine. Federal Register Vol 74, N. 235, December 2009.

Other findings

This section presents market linkage-related findings outside the three sub-headings of contracts, finance and prices.

There is concern about the quality of the feed. Several poultry and swine producers complained that feed quality is unreliable and that there is no way to know the quality of feed except through experience. According to a large meat processor who raises most of their animals on their own farms, being able to control the feed quality they use is the number one factor behind the high quality of its meat. Unreliable feed quality can also, in the worst-case scenario, lead to livestock mortality through toxic feed. This was reported by a cooperative filing a lawsuit against a large feed manufacture over what it claims as toxic feed that killed 200 of its chickens.

Fish pond producers may not be business oriented. Fish ponds have been viewed as a tool to fight malnutrition by the government and I/NGOs alike. Producer groups or cooperatives may be given access to low lying land by local government in order to make ponds. Fish ponds have sometimes been constructed by I/NGOs who may have also provided fingerlings. However, once the initial investment in capital by a project is over, the producers may not have acquired the business orientation or skills to have put aside money for renovating ponds or replacing fish. As a result, productivity declines.

Feeding and disease control practices could be improved according to producers, veterinarians and agrodealers. However, public vets who are located at the sector level have many responsibilities including treating animals, inspecting animals before slaughter, inspecting slaughter houses, coordinating implementing livestock projects and providing training. They may also lack expertise on fish production as there is limited training provided for them on fisheries.

There is limited data on livestock. District level governments said that they do not have data on livestock in their district and are still using data from 2006. An exporter also made similar comments, adding that there was no data on livestock consumption either. While there is annual national data collection for crop agriculture, there is no equivalent data collection for livestock.[44]

Figure 19 provides a summary view of the swine market.

Figure 19 Swine Market Linkages Snapshot

[44] National Institute of Statistics Rwanda (2020). Surveys. Accessed April 2020.

Swine market linkages snapshot - Southern Province

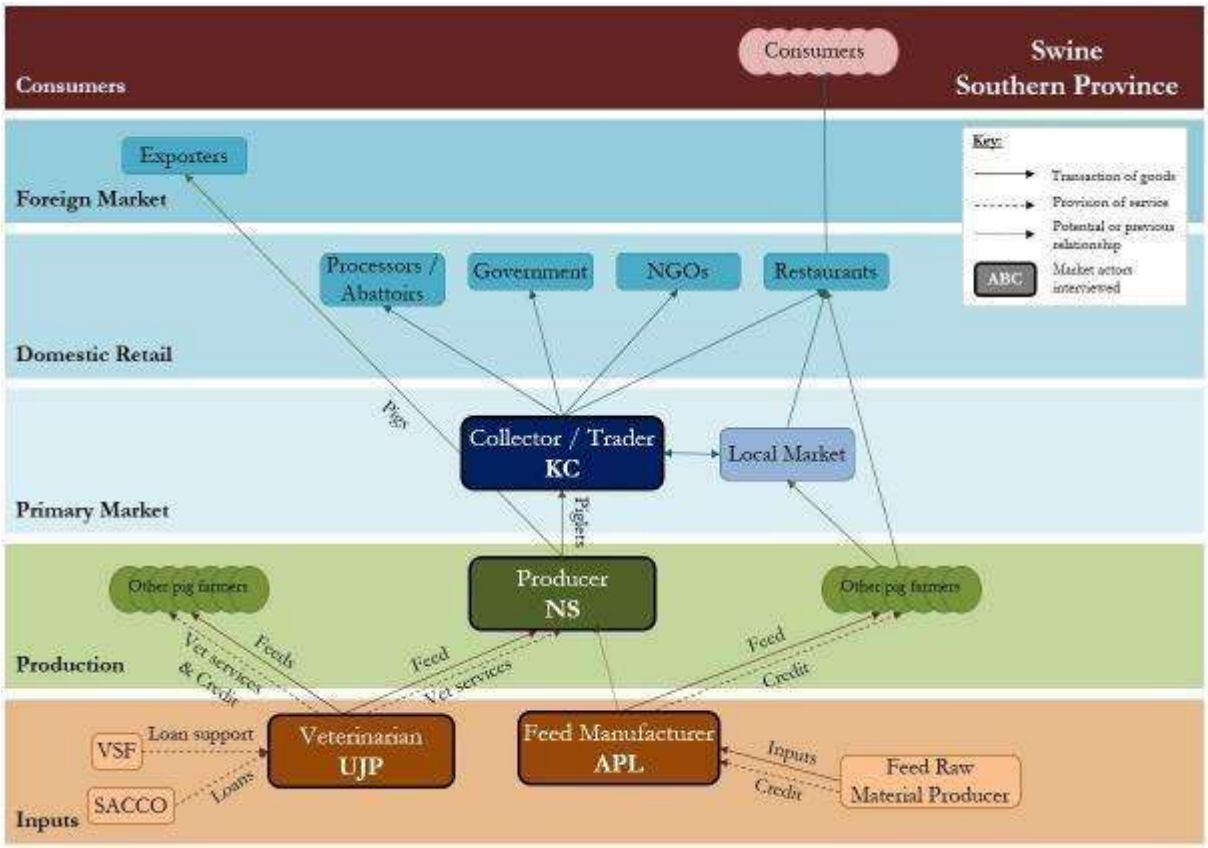
Pig producer - NS produces pigs and poultry and has 13 adult pigs along with 65 piglets. He sells his adult pigs to exporters and his piglets are sold to individuals, sometimes through a middleman. He negotiates a price with his buyer but it is not based on weight since he does not have a scale. Because feeds have become too expensive, he has started to make his own feeds from raw materials.

Veterinarian - NS gets veterinary services from a young private vet named UJP. In addition to veterinary consultation, he provides pig feeds and breeding for cattle. Including NS, UJP has about 20 pig producing clients. UJP offers his customers his services on credit as part of his efforts to provide good customer service. This arrangement works for UJP. He received a loan from SACCO, with help from Veterinaire sans Frontieres.

Feed manufacturer - NS previously purchased feed from APL feeds. They experienced declining sales in 2019 but saw maize prices start to decline at the time of the interview. APL has about 30-40 regular customers and bases their price on the cost of feed materials. They do not have contracts with his buyers but wishes he did in order to help plan his production. APL offers credit to regular clients and says that it is not possible to get customers without offering them credit. They also get some of their raw materials on credit.

Trader - KC is the middleman who buys pigs from NS. He collects swine (and goats) from several districts, feeds them and then resells them to other producers, NGOs, the government and sometimes restaurants or processors. He often buys from the market based on the health, age, sex and price of the animals. KC looks for background information on the seller so he knows they are trustworthy and he is not buying a sick animal. He offers is buyers a satisfaction guarantee so that if they are not happy with the animal, he will find them another.

Restaurant – One of KCs clients is a restaurant that slaughters pigs and makes roasted pork brochettes served with Irish potatoes. A lot of their clients work in coffee and so their business comes and goes with the coffee season. They buy about 3 pigs per week based on the age, the price and those with lower fat content. They also buy pigs at the market or directly from producers



Annex 1: Summary of Interviews

	Eastern	Northern	Western	Southern	Kigali	Total
Input						
Agro-dealers	4	4	4	5	0	17
Vet pharmacies	2	2	2	2	2	10
Veterinarians	5	4	4	6	3	22
Input wholesalers	1	2	0	0	6	9
Hatcheries (fish and chicken)	1	0	1	1	2	5
Breeders (goats and pigs)	1	1	1	0	0	3
Feed manufactures	2	3	0	1	4	10
Output						
Producer						
Backyard	4	2	4	3	0	13
Small - semi commercial	3	5	4	3	0	15
Med-Large commercial	4	3	2	3	0	12
Producer Groups/Cooperatives	4	5	4	5	0	18
Collectors/aggregators	1	2	3	2	0	8
Output wholesalers	2	3	1	2	2	10
Exports	0	0	0	0	6	6
Slaughterhouse/abattoir, butchers and processors	4	3	4	2	3	15
Small retail stores	3	2	2	1	3	11
Stall at market	1	1	1	1	1	4
Supermarket	1	0	1	1	2	5
Restaurants/hotels	1	4	2	4	3	14
Consumers	9	9	8	8	9	43
Support						
Transporters	1	0	0	0	2	3
Banks	1	0	0	0	4	5
Microfinance	0	1	0	0	2	3
Mobile finance	0	0	0	0	1	1
Government finance	0	1	0	0	2	3
Business advisory services	2	1	0	0	2	5
Enabling						
National government	0	0	0	0	3	3
Local government	4	4	2	4	0	14
I/NGOs	0	0	0	1	3	3
Youth, women and PWD orgs	0	0	0	0	2	2
Business associations	0	0	0	0	3	3
Government research	0	0	0	0	3	3
University research	0	0	0	0	1	1
Private sector research	0	0	0	0	2	2
Newspaper, radio, TV	0	0	0	0	4	4
Total	**61**	**62**	**50**	**55**	**80**	**308**

Annex 2: Scope of Work

Background on the Feed the Future Rwanda Orora Wihaze Activity

In October 2019, USAID/Rwanda awarded the 5-year Feed the Future Rwanda Orora Wihaze Activity to Land O'Lakes Venture37 to *sustainably increase the availability of, access to, and consumption of animal-sourced foods (ASF) through development of a profitable market*. Venture37 and its consortium members, Catholic Relief Services (CRS), MarketShare Associates (MSA), The Manoff Group (TMG) and Urunana, will achieve this goal by strengthening inclusive private sector-led ASF value chains through facilitating chicken, swine, goat and fish productivity improvements and strengthening relationships amongst market system actors. The team will facilitate access to finance for enterprises and will utilize a grant fund to catalyze innovation and investment across the ASF sector. The Venture37 consortium will also increase demand for ASF consumption for women of reproductive age and children 6-23 months by increasing the safe consumption of ASF produced by target households, increasing the availability and accessibility of ASF for safe consumption in target districts, and fostering greater women's empowerment. Project interventions will be conducted through a market systems development (MSD) approach, under which the project will partner with market actors to carry out interventions that reach project objectives. Target districts in Rwanda include Rutsiro, Ngororero, and Nyamasheke in the West, Burera and Gakenke in the North, Nyamagabe in the South, and Kayonza and Ngoma in the East. By the end of this five-year activity, USAID will have increased the income of 125,000 households by 30%, increased farmer and firm sales by 45% and 35%, respectively, and increased the prevalence of children under 2 and women of reproductive age receiving a minimum acceptable diet by 40% of baseline.

Purpose of the Baseline

The MSD approach that Orora Wihaze will use is highly facilitative in nature; the objective is to encourage sustainability and replicability of partner-led changes, as well as to spark shifts in interactions amongst market actors. The success of Orora Wihaze will be measured through two types of indicators: 1) the typical intervention-level indicators, which measure progress in achieving set nutrition and income outcomes; and 2) qualitative market system indicators, which measure changes in systems dynamics, incentives, social norms, services, and policy structures influencing producers and consumers of ASF. The purpose of the baseline is to establish the starting point for each of these indicators, while also learning more about ASF market system dynamics. Annex 1 lists the Orora Wihaze indicators, including detail on the type of indicator and whether the preliminary baseline will be established in this study.

Key Systems Level Changes and Study Questions

Orora Wihaze posits, as depicted in its results framework (see Annex 2), that the pathways to inclusive private sector growth for ASF value chains and demand for ASF consumption for women and children rely on system changes in at least four (4) key areas:

1. Business practices of ASF market actors to reach target population, ASF producers and consumers
2. Enabling environment for businesses in the ASF sector supported by the Government of Rwanda
3. Ability of women, youth, and persons with disabilities (PWD) to access ASF resources and services;
4. Informal rules around consumption in the household.

These systems level changes focus on interactions between multiple actors in the market system. In turn, the key study questions, listed in Table 1, are focused on how actors, even if they will not have any direct support from Orora Wihaze, interact with others in the system.

Table 1. Key Study Questions

Area of Study	Key Question
Cooperation and Trust	What formal and informal rules and expectations between producers and other market actors affect the flow of information, financing, and commercial exchange of goods and services?
Business Model Innovation	What kinds of changes—organizational, marketing, process, or product innovations—are agricultural market actors making to their business models, if any? What is the pace at which changes are being made?
Value creation	To what extent are market actors designing improved technologies, or implementing production and management practices to be inclusive of women, youth, and PWD?
Ecological factors related to food intake	What aspects of the family or home environment related to food intake (e.g. home availability or accessibility of certain foods) are linked with dietary behavior?
Market linkages	What types of market linkages and supply-chain coordination and development models for animal source foods across the implementation districts are most effective in linking farmers to profitable markets and improving quality and efficiency in the market?

Baseline Design and Methodology

This section details the research team, methods, and implementation for the baseline study.

Research Team

Consortium member, MSA, will lead the overall management and quality assurance of the baseline study with support from Venture37 monitoring, evaluation and learning (MEL) staff. This will include conducting a desk review, setting the baseline methodology, developing tools, overseeing data collection, and conducting analysis and reporting. A best practice in conducting market systems baselines is the use of Activity staff to meet and interview market actors to collect data on the constraints and opportunities in the market system in order for the staff to establish relationships with the market actors. With that in mind, Venture37 and CRS field staff will conduct the qualitative interviews. MSA experts will provide short term technical assistance in Rwanda to train field staff and oversee data collection. All other MSA oversight will occur remotely.

Baseline Methodology

To meet the baseline objective and answer the five key questions above, the baseline will collect primary qualitative data from key market actors to explore the behaviors and relationships of actors in the ASF market system, and review existing secondary data related to the target value chains to set intervention level baselines. The interviews will focus on actors in the target districts, but will also include actors in other areas of Rwanda that are involved in the ASF market system. Qualitative data will be collected using two main sampling approaches: 1) Quota sampling strategy and 2) Chain referral sampling strategy. This section describes the quota sampling strategy, chain referral sampling strategy, and secondary data review strategy.

Quota Sampling Strategy

For the proposal, Venture37 did a preliminary mapping of the actors in the ASF market system supporting the chicken, pig, goat and fish value chain. Per the BEAM exchange's guidance on market system mapping, MSA has organized the actors in the system by the function they play.[45] Table 3, at the end of this subsection, depicts the preliminary mapping to be used to select market actors to interview for this study.

The functions of the market system are divided into four categories: the "core functions" of Input Distribution and Supply Chain and the "supporting functions" of Supporting Services and Other Enabling Environment Actors. The "core functions" focus on the actors involved in the exchanges of goods and services. Supporting Services refer to the services, resources, and infrastructure that enable the core functions of the market system. For example, what vaccine producers and vet pharmacies decide to produce or to sell may depend on electricity and transport services available in rural areas. Supporting services can include a range of functions from finance and transport to mechanization services and Information and Computer Technology (ICT) solutions. The Other Enabling Environment Actors refers to the actors that influence formal and informal rules on behavior, like important government agencies such as RAB and MINSANTE, to the community radio or local universities. This category also includes those actors that strongly influence gendered norms and perceptions of women, youth and PWD, which may include religious groups and social leaders.

Through additional secondary research and discussion with Orora Wihaze staff, MSA will revise the actor map, and populate the list of specific actors within these categories for participation in the qualitative study. For each type of actor, MSA will develop interview protocols and semi-structured guides. Guides will be translated into Kinyarwanda, and translations will be reviewed by a native speaker for validation. Guides will ask qualitative questions to answer the five key study questions above. Actors may also be asked for quantitative information to inform intervention-level indicators. The responses will benchmark how each actor operates, with whom they interact, and how their interactions affect or take into consideration consumption norms in Rwanda, if at all.

To determine the number of interviews to conduct with each type of actor, MSA will set quotas per actor type based on their assessment of the relevance and strength of the actor in the market system, and the prevalence of actor types that exist in the system. For some actor types that are value chain specific, quotas may be set at the value chain level. The use of quotas, while not statistically representative, will ensure discussions with the key actors in the market system for the four target value chains – poultry, pig, goat and fish. Interviews will continue until the quota and/or information saturation is met. While good practice for qualitative sampling aims for 6-12 interviews per actor type, in carrying out similar studies MSA has found saturation can be reached after interviewing 5-6 respondents for large populations and as few as 2-3 key informant interviews for smaller populations (i.e. shopkeepers, agents etc.). As such, while quotas will be set, if we find we are reaching saturation, we may prioritize more interviews with other actor types. Information saturation is determined when no new information is being gained by interviewing another actor of the same type.

The sampling approach will also ensure that Orora Wihaze has mapped urban-rural influences and dynamics between each of the functions in the market system, as well as contextualizing the market system in each of the target districts. A key consideration for the literature review and sample selection will be the predominance of goats, sheep, fish and chicken by district. Swine is a nascent sector and will be contextualized accordingly. The selection of actors for interviews across the eight target districts will be

[45] See https://beamexchange.org/guidance/analysis/mapping/

informed by secondary research, project staff knowledge of the key players and geographies, and referrals by district and local actors.

Table 3. Types of Actors in the Agricultural Market System

System Function	Actor Type
Input Distribution	Vaccine producers
	Vet pharmacies (i.e GALVmed)
	Feed Manufacturers (i.e. Zamura, Gorilla)
	Input wholesalers (i.e. Agrotech)
	Hatcheries (i.e. National hatchery, Rubirizi)
	Private breeders
	Gear/ equipment providers
	Input agrodealers
	Distributers
Supply Chain	Backyard micro-producers
	Small-scale semi-commercial producers
	Medium to large producers (i.e. PEAL, Rwanda Best)
	Farmer groups and cooperatives (i.e. Rwanda Pig Farmers' Association)
	Collectors/ Aggregators
	Small scale traders
	Processors/ butchers/ abattoirs (i.e. Rugari Meat Processing Company)
	Exporters
	Retailers (supermarkets, restaurants, hotels, bars)
	Household consumers (men and women)
Supporting Services	Transporters
	Government sector vets and paravets
	Private veterinary technicians
	Business incubators/ local business development consultants
	Microfinance (SACCOs, Micro Finance Institutions, BDF)
	Banks

System Function	Actor Type
	Mobile Banking (i.e. Vision Fund Rwanda)
Other Enabling Environment Actors	Industry Associations (i.e. Rwanda Poultry)
	Government Actors (i.e. Minagri, RAB)
	International Development Actors (i.e. FAO, Heifer)
	Universities (i.e. University of Rwanda)
	Local Government
	Community Radio
	Researchers (i.e CGIAR)
	Journalists

Chain Referral Sampling Strategy (4 case studies)

While quota sampling is useful to get an overall snapshot of the dynamics of the various actors involved in the agricultural market system, it also illustrates the complexities of relationships within the system. To help navigate this complexity, and to not lose focus on the smallholder producer or rural consumer of ASF, MSA finds it useful to include case study examples of producers or consumers in the baseline.

To conduct this case study approach, MSA, with support from the Orora Wihaze staff, will begin by selecting a single "typical" producer in each of the four target value chain, consistent with target farmer profile for Orora Wihaze. Using a chain referral sampling strategy,[46] or getting referrals from the actor you are interviewing to understand who to interview next, the case studies will explore direct horizontal and vertical relationships from the producer out through the market system. The relationship exploration will consist of a series of questions to determine with whom the actor does business and who and what influences those decisions. Tracing relationships vertically means moving upward through the system – from inputs suppliers, to producers, to aggregators and traders, and ultimately to product retailers – looking for how these actors do and do not interact, share information, and build relationships of trust and cooperation. Tracing relationships horizontally means investigating these dynamics by moving across actors of the same or similar types, such as producers collaborating with other producers through associations or producers organized around shared financial goals through savings groups. This case study approach will be used to map market relationships in the poultry, goat, pig and fish value chains.

While the intent is to select producers who can be references for the types and dynamics of relationships in the system, the selected producers are not meant to be representative of each value chain. Rather, the qualitative findings from each case are meant to highlight the corresponding broader findings on market system indicators from the quota sampling approach to ground how to interpret them. For example, it may happen that a smallholder producer does not know the name or contact information of who bought their chickens; they may know however that they were likely sold at the live bird market. Wherever possible, case study linkages with interviews from the quota sampling will be drawn to trace relationships.

[46] See here for more specifics.
http://changingminds.org/explanations/research/sampling/snowball_sampling.htm

Secondary Data Strategy

As will be described in the MEL plan, baselines for the intervention-level indicators will be set on a rolling basis with partner organizations as they are identified throughout Activity implementation, as is standard when using an MSD approach. Nevertheless, to set preliminary baseline values for these intervention-level indicators, MSA will review existing data from USAID, GOR and other sources to establish preliminary baseline snapshot values. This will include reviewing baseline numbers that were submitted in the proposal to determine if updated or more targeted data is available. These preliminary baseline values will be entered into the Feed the Future Monitoring System (FTFMS) and use to compare future values. As updated baseline values are established on a rolling baseline, Orora Wihaze will report both the initial and updated values in the periodic reporting and make comments in the FTFMS during the yearly reporting.

By the time the market system baseline study data collection is underway, Orora Wihaze expects to have potential partners identified and to be able to collect baseline data from the "early mover" partner firms as the partnerships are formed in mid-2020. However, subsequent intervention baseline data will be captured from new partners and corresponding beneficiary groups on a rolling basis.

Implementation Process

The implementation processes include data collection, management and analyses to complete the study.

Data Collection/Field Implementation Plan

The fieldwork will be conducted over the period of about 3 to 4 weeks. First, MSA will train select staff to pilot a few of the interview guides and the protocol. After the pilot, revisions to the guide will be made, as needed. MSA technical staff will travel to Rwanda to train the full set of data collectors. Training will cover qualitative interviewing techniques, including probing and building rapport, evaluation ethics, data quality control and management processes. Interviews with key informants will be conducted by ten Activity staff, two MEL staff and 8 technical advisors.

Semi-structured interviews will be held in a private, centrally located place, determined in conjunction with the respondent. In some instances, this may be an office space, if not, we will expect the interviewees to direct us to a location where the exchange can take place without interruption. Refreshments (water, coffee, tea, or soda) may be offered to interview participants. Prior to beginning each interview or group discussion, the data collectors will review the consent form, ensuring the respondent(s) have an opportunity to ask questions and make an informed decision about whether to participate. Interviews will be conducted in the local language or in English, whichever is preferred by the participant. Whenever possible, data will be captured using a digital audio-recorder, transcribed, and then translated into English for analysis.

The fieldwork will be adaptive. Regular check-ins and time to reflect on the findings will be built into the workplan to assess if saturation is being reached, and if the sampling strategy should be increased or otherwise adjusted for any of the sub-samples or a particular actor type.

Data Management and Security Procedures

All data collectors will be trained in protecting human research subjects during the data collection training. The data collection tools and consent forms will be submitted for National Institute of Statistics Rwanda (NISR) review prior to data collection, as required.

At the start of each interview, data collectors will read a standardized informed consent and confidentiality statement in the local language explaining:

- purpose of the research
- procedures and duration of data collection (including permission to record)
- potential risks and benefits
- confidentiality and their right to refuse/withdraw
- who to contact with any questions or concerns

Data collectors will ask respondents if they have any questions about the interventions, interview, or survey, and provide answers. Respondents will then be asked for written consent to participate and permission to audio-record the conversations. If written consent is not acceptable to the respondents, either through signature or fingerprint, verbal consent will be acceptable and documented in the audio-recording.

Notetakers will record field note responses and discussions by hand and then type them up at the end of the day for team daily updates. Preference will be given to verbatim responses that should be reported within quotation marks. Upon completion of the data collection, interviewers will send all raw data to MSA for storage in a shared file and permanently remove it from their own computers, tablets, external hard drives, etc. The shared drive will be password protected so that project file sharing is controlled by the research team, and access is only granted to those working on the research project. Raw data will be removed from the shared drive and destroyed after it is no longer necessary for it be accessed by staff. All Personal Identifiable Information (PII) will be removed before sharing with USAID's Development Data Library and Development Experience Clearinghouse. If there is any breach in these protocols at any point, the issues will be reported to MSA along with an explanation of the cause of the breach for a determination of appropriate corrective action. Data collection will be ceased until a final determination by the MSA and Venture37 is made.

Data Quality Assurance

MSA will incorporate a number of data quality checks in the collection and analysis of data to ensure both quality of the data collected, but also the inferences drawn. First, MSA will instruct data collectors on proper, ethical data collection procedures and qualitative techniques. Use of recordings and transcriptions of verbatim responses will be used, when possible, to limit paraphrasing of respondent intention. During data collection, the MSA coordinators will periodically supervise interviews for quality and hold daily debriefs with each data collector. Data collectors will also provide general updates, questions, and concerns on WhatsApp. Where the MSA coordinator discovers deviations from established protocols they will take corrective action with the data collector. Data flows will also be controlled by establishing timelines and protocols to conduct interviews, share notes with the MSA coordinator and upload to a shared file. Routine data spot checks will be conducted to ensure that data collected is valid, reliable, and free from manipulation. Once data is shared with the MSA coordinator, any and all changes to entries will be registered and tracked in the data analysis software and shared files.

MSA will also manage the quality of how the research team uses the data analysis software to draw inferences from the data. To this end, MSA will develop codebooks and thematic code summaries. MSA with employ the best practice of holding a workshop with the research team once analysis is complete to review the code summaries with the participation of at least one non-research team members to ensure the inferences drawn from the data are linked to quotes and data points from the respondents.

Data Analysis

Interview data will be coded using NVivo 12 Plus, a computer-based application for managing, analyzing, and presenting qualitative and mixed method research data. Only members of the research team with NVivo12 will have access to the coded interviews.

For each qualitative data set, the coding structure for thematic analysis will be developed collaboratively and iteratively using a combination of deductive and inductive approaches, based on the study questions. After some portion of the transcripts have been coded, the research team will meet to further refine the coding structure as needed. Any revisions to the coding scheme will be applied to the entirety of the data set. Codes will be grouped together into categories reflecting the key system changes and study questions.

An overall comparative analysis approach will be used, looking at similarities and differences by gender and age. Data will also be compared by geography and value chain.

Timeline

Task	Responsible	Oct 2019	Nov 2019	Dec 2019	Jan 2020	Feb 2020	Mar 2020	Apr 2020	May 2020
Baseline Design and Preparation Phase									
Design results framework	Venture37								
Design actor maps	MSA								
Refine the results framework and results chains	MSA								
Review and revise actor maps	MSA								
Conduct initial literature review for high-level trends for each market function related to key value chains	MSA								
Draft interview protocols and guides by actor types	MSA								
Set quotas by actor type and parameters for 4 case selections	MSA								
Review the qualitative field work plan with the technical and MEL staff	MSA								
Seek and receive approval from the National Institute of Statistics Rwanda (NISR)	Venture37								
Draft, review, and agree on baseline report outline	MSA								
Baseline Data Collection Phase									
Train technical staff on guides and protocols	MSA								
Pilot interview guides and protocol with select actors	Technical Staff								
Refine interview guides and review protocol based on pilot	MSA								
Develop and deliver qualitative research training using Excel and NVivo.	MSA								
Conduct qualitative data collection	Technical Staff								

Transcribe raw data in English	Technical Staff								
Ongoing quality review of transcription	MSA								
Hold an out-brief session with Orora Wihaze staff on data collection process and observations	MSA								
Baseline Data Analysis and Reporting Phase									
Develop and refine thematic coding structure	MSA								
Code all raw data collected	MSA								
Summarize findings by code	MSA								
Hold a code review workshop to validate research team findings and interpretation.	MSA								
Finalize Analysis	MSA								
Draft of baseline report	MSA								
Review draft	Venture37								
Final draft of baseline report	MSA								
Submit baseline report to USAID on April 30, 2020	Venture37								
Present findings to Orora Wihaze and USAID/Rwanda Staff	MSA								
Support MEL team with raw data storage format and process	MSA								
Upload the approved baseline report to the DEC and data and associated description to the DDL[47]	Venture37								

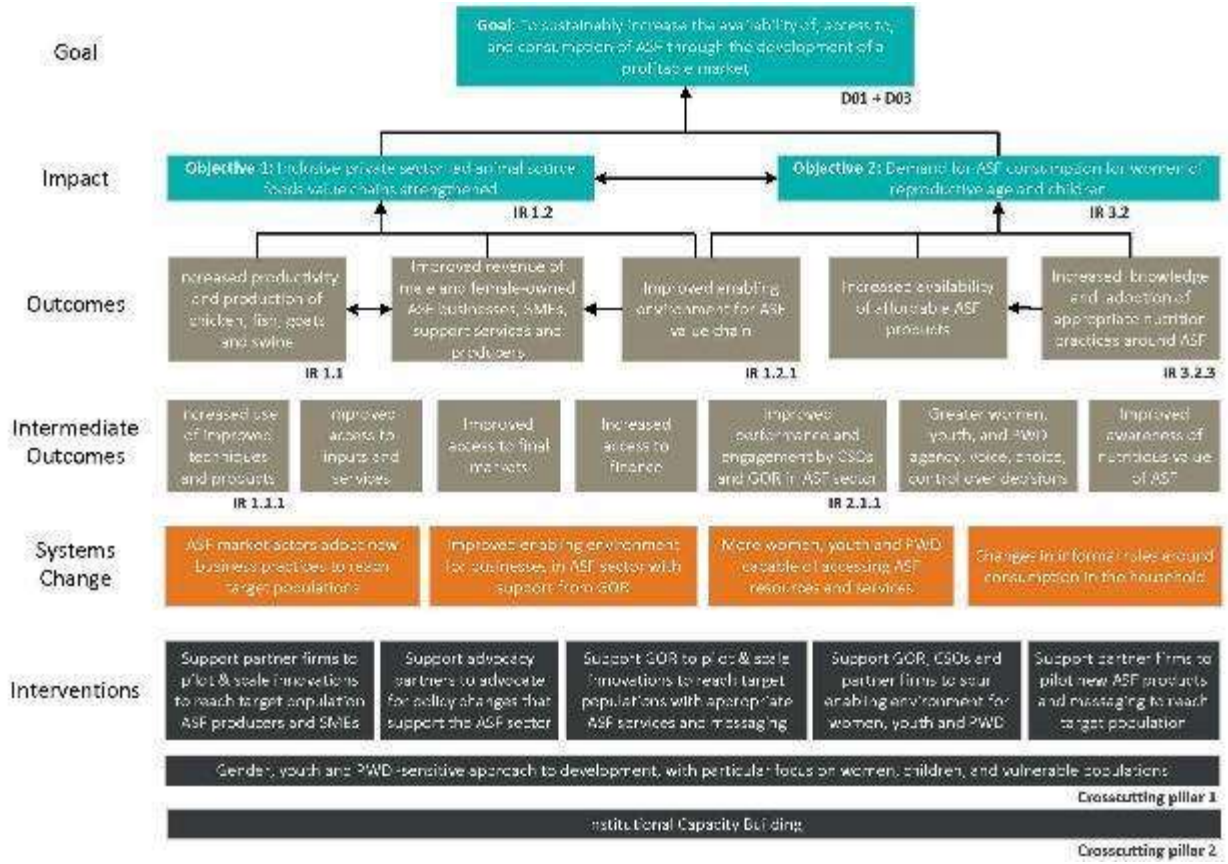
Orora Wihaze Indicators

Indicator	Indicator Type	Preliminary Baseline Established
Number of households with incomes increased by at least 30%	Intervention-Level Outcome	Yes
Prevalence of children 6-23 months receiving a minimum acceptable diet	Intervention-Level Outcome	Yes
Prevalence of women of reproductive age consuming a diet of minimum diversity	Intervention-Level Outcome	Yes
Observed shifts in trust and cooperation between smallholder producers and other market actors	Market System	Yes

[47] If the document is submitted to the DEC or DDL in PDF Format: Prior to uploading reports or data sets, we will conduct a 508 compliance check using the GSA guidelines provided at https://www.section508.gov/create/pdfs. For data uploaded to the DDL in Microsoft Excel: Prior to uploading data sets to the DDL, we will conduct a 508 compliance check using the GSA guidelines provided at https://www.section508.gov/create/spreadsheets

Value of new USG commitment and private sector investments leveraged by the USG to support food security and nutrition	Intervention-Level Outcome	No
Value of annual sales of farmers and firms receiving USG assistance	Intervention-Level Outcome	Yes
Yield of targeted agricultural commodities among program participants with USG assistance	Intervention-Level Outcome	Yes
Number of individuals in the agricultural system who have applied improved management practices or technologies with USG assistance	Intervention-Level Outcome	Yes
Value of agriculture-related financing accessed as a result of USG assistance	Intervention-Level Outcome	Yes
% of female participants in USG-assisted programs designed to increase access to productive economic resources	Intervention-Level Output	No
% of participants in USG-assisted programs designed to increase access to productive economic resources who are youth (15-29)	Intervention-Level Output	No
Milestones in improved institutional architecture for food security policy achieved with USG support	Intervention-Level Output	No
Average business model innovation score	Market Systems	Yes
Number of children 6-23 months benefiting from USG assistance consuming ASF in the previous day and night	Intervention-Level Outcome	Yes
Number of women of reproductive age benefiting from USG assistance consuming ASF in the previous day and night	Intervention-Level Outcome	Yes
Quantity of ASF nutrient rich commodities produced by direct beneficiaries with USG assistance that is set aside for home consumption	Intervention-Level Outcome	Yes
Observed shift in ecological factors related to food intake	Market Systems	Yes

Results Framework



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Annex 4: Custom Performance Indicator Reference Sheets from AMELP

Performance Indicator Reference Sheet #4
Name of Indicator: Observed shifts in trust and cooperation between smallholder producers and other market actors[48]
Result Measured: Goal – Sustainably increase availability of, access to and consumption of animal source food through development of a profitable market
DESCRIPTION
Precise Definition(s): *Cooperation* and *trust* refer to the informal rules and expectations in the market systems that govern behavior and set expectations among and between market actors. This indicator measures the degree to which cooperation and trust are established norms within the Animal Sourced Foods (ASF) market system. Norms are defined as informal rules that govern collective behaviors and expectations of behavior. The indicator looks at two dimensions of cooperation – belief in the importance of ongoing relationships and belief in mutually beneficial purpose – assessing levels of expectation of cooperation on a scale from 0 (low) to 3 (high). The indicator further looks at three dimensions of trust – integrity, competence, and reliability[49] – assessing both the intentions and the abilities of market actors with a score of 0 to 3, using thematic analysis. Each of the five dimensions is assessed from the perspective of the roles of providers and consumers, resulting in 10 thematic codes applied and analyzed using NVivo and thematic analysis. For scoring, each of the 10 codes is scored according to assessment criteria of: 0=reference group does not expect this to be true 1=it would not be entirely unexpected if this were true 2=it is most appropriate if this is true 3=this is fully expected and there are major consequences for market actors who defy expectations. The scores of each of the 2 dimensions are then averaged and rounded to the closest whole number on the scale of 0-3. They are all weighted equally, if the confidence levels are high. If confidence levels are ranked medium or low, weighting is applied. Cooperation is scored according to expectations[50] by producers and firms rather than the act of cooperating itself. The overall scores are an average of the scores for each dimension of cooperation and trust, disaggregated by buyers and sellers. Cooperation requires trust and also reinforces it. Cooperation occurs when market actors believe that an ongoing relationship is important enough to warrant determined efforts to maintain it. It does not occur only out of necessity to avoid conflict or to take advantage of a short-term opportunity. Cooperation occurs when there is an understanding that it can lead to mutually beneficial outcomes that can exceed the outcomes that could be achieved individually. Cooperation can be

[48] This indicator is a custom indicator adapted from the FTF Inova Mozambique Activity.
[49] Paine, K.D. Guidelines for Measuring Trust in Organizations. University of Florida Institute for Public Relations Commission on Public Relations Measurement and Evaluation. January 2003.
[50] Norms theorists stress the importance of collective expectations about "what others do" and "what others think should be done" rather than individual perceptions. Orora Wihaze is analyzing what are the expectations of how producers should or will act and likewise consumers.

exemplified in long-term customer orientation from the supplier's end and brand loyalty from the customer's end. Trust is an important determinant of a successful commercial relationship and can be reflected in positive expectations between market actors. While definitions vary, it is frequently defined as a willingness to take risk and a willingness to rely on an exchange partner in whom one has confidence. In other words, when actors trust each other, "they also continuously maintain positive feelings by disregarding negative attributions in the related actors in order to confirm their positive trusting attitudes."[51] However, trust does not occur automatically, and partners on both sides of a business relationship "must first convince themselves of the partner's ability, reliability, and their integrity."[52] When trust is established, the perception of risk in relation to opportunistic behavior is reduced, and there is an increase in confidence that short-term inequities will be resolved. Research shows that this can lead to a reduction in transaction costs.[53]
Unit of Measure: Observed shifts (qualitative); index
Data Type: Index
Disaggregated by: Market system function and value chains
PLAN FOR DATA COLLECTION
Data Source: Partner firms and other similar firms in the targeted market systems as well as other relevant reference groups who can attest to prevailing norms.
Method of Data Collection and Construction: Key Informant Interviews (KIIs)
Reporting Frequency: Baseline, Mid-term, Final
Responsible individual(s) at the Activity: Market Systems Change Advisor and MSA
BASELINE
Baseline Timeframe: By May 2020
DATA QUALITY ISSUES
Dates of Previous Data Quality Assessments and Name of Reviewer(s): N/A
Date of Future Data Quality Assessments: Internal data quality assessments on will be conducted in the baseline data analysis interpretation workshop and again at midline and final assessment.
Known Data Limitations: It is difficult to get precise data on data of this nature and we will take effort to minimize selection, affect, and question bias.
THIS SHEET WAS LAST UPDATED ON: November 2019

[51] Andersson, U., Johanson, M. and L. Silver (1997). The Role of Trust, Cooperation and Commitment in Business Relationships. In Mazet, F; Salle, R; Valla, J. IMP Conference (13th): Interaction, Relationships and Networks in Business Markets; 04 Sep 1997-06 Sep 1997; Lyon, France. IMP; 1997. Available at: https://www.escholar.manchester.ac.uk/item/?pid=uk-ac-man-scw:2n675

[52] Batt, Peter (2000). Modelling buyer-seller relationships in Southeast Asia. In Ford, D. and Naude, P. and Ritter, T. and Turnbull, P.W. and Leek, S. (ed), 16th Annual IMP Conference, 1 Sep 2000, pp. 1-28. Bath, United Kingdom: University of Bath. Available at: https://espace.curtin.edu.au/bitstream/handle/20.500.11937/8110/169648_43232_07897.pdf?sequence=2&isAllowed=y

[53] Ganeson, (1994). Determinants of Long-Term Orientation in Buyer-Seller Relationships. Available at: https://warrington.ufl.edu/retail-center/

Performance Indicator Reference Sheet #11
Name of Indicator: Average business model innovation score[54]
Result Measured: Objective 1: Inclusive private sector-led ASF value chains strengthened
DESCRIPTION
Precise Definition(s): The business model innovation scoring index was developed to measure incremental innovation in existing business models. The index is comprised of 13 questions within four categories: product/service innovations, process innovations, marketing innovations, and organizational innovations. The BII identifies purposeful innovation by firms, whether novel or through adaptation, by ranking the number of innovations on a scale of 0 (no innovation reported) to 1 (5 or more innovations reported). Each innovation question below is scored for each "yes" answer. The total "yes" answers are summed and multiplied by 20% to correspond with the index scale. The scores are then averaged for an overall score. 1. In the last 6 months, has your business begun offering a new product (or service) to customers or have you adjusted an existing product (or service)? 2. In the last 6 months, has your business changed the way it stores final products (or service)? 3. In the last 6 months, has your business changed the way it transports products (or service)? 4. In the last 6 months, has your business changed the way it packages its products? 5. In the last 6 months, has your business changed the way it grades its products? 6. In the last 6 months, has your business changed the way it accesses information about the market (any information)? 7. In the last 6 months, has your business changed the way it accepts payments for its products? What about the way it pays suppliers? 8. In the last 6 months, has your business changed the way it tracks internal finances and/or inventory? 9. In the last 6 months, has your business changed its advertising? 10. In the last 6 months, has your business changed the number of functions it performs in the value chain (increased/decreased vertical integration)? 11. In the last 6 months, has your business changed its hiring strategy? 12. In the last 6 months, has your business changed the way/amount it invests in staff capacity? 13. In the last 6 months, has your business changed the way/amount it invests in supplier and customer capacity? At baseline, the BII can be used as a diagnostic tool that can showcase the existing momentum of innovation within a company. The results from the BII at mid-term and end-line can show changes in levels of innovation over time.
Unit of Measure: Score
Data Type: Index
Disaggregated by: Market system function
PLAN FOR DATA COLLECTION
Data Source: Partner firms in the targeted market systems as well as other relevant reference groups.
Method of Data Collection and Construction: Interviews with closed questions (13) and probing on affirmative responses.
Reporting Frequency: Semi-annually

[54] This is the sixth module used to measure the health of a market system in USAID's LEO's Handout on Practical Tools. https://www.agrilinks.org/sites/default/files/resource/files/HANDOUT%20-%20LEO_Brief_System_Health_Tool_FINAL.pdf

Responsible individual(s) at the Activity: Market Systems Change Advisor and MSA
BASELINE
Baseline Timeframe: May 2020
DATA QUALITY ISSUES
Dates of Previous Data Quality Assessments and Name of Reviewer(s): N/A
Date of Future Data Quality Assessments: Internal data quality assessments on will be conducted in the baseline data analysis interpretation workshop and again at midline and final assessment, if not more frequently.
Known Data Limitations: The closed question (Yes/No) is insufficient to capture details on the nature of the innovations pursued. In data collection we will probe for more information to accompany affirmative responses.
THIS SHEET WAS LAST UPDATED ON: November 2019

Performance Indicator Reference Sheet #15
Name of Indicator: Observed shift in ecological factors related to food intake (ASF intake ecological index)
Result Measured: Objective 2: Demand for ASF consumption for women of reproductive age and children of 6-23 months increased
DESCRIPTION
Precise Definition(s): Ecological factors refer to the contextual aspects in the home or community that influence dietary behavior (for example home availability or accessibility of certain foods). These factors capture the patterns of decisions that influence diet but do not attempt to directly measure diet, which can make them easier to recall and less susceptible to various types of bias. To be effective, ecological factors need to refer to behaviors, conditions, and beliefs that can be modified and, which if modified, results in a change in diet. [55] Many contextual factors affect dietary behavior. No single factor explains why we choose to eat what we do. To understand the factors that influence the complex series of decisions that lead to dietary behavior, the indictor looks at interactions among factors at three levels—the individual (agent-level), the interpersonal (networks), and the institutional (norms). At the individual level, there are many factors including, but not limited to their own attitudes, beliefs, and knowledge about ASF, convenience, costs, familiarity, voice and choice in purchase and consumption, and health status that may be considered. At an interpersonal level, factors may include, but are not limited to, the frequency of ASF being eaten at family meals, social gatherings, and at schools and churches. Factors may also include the presence of household rules about consumption of ASF by women and children as well as around what ASF produced by the household that can be consumed. At the institutional level, factors may include, but are not limited to, the influence of the community and government. For example, we may consider the availability/accessibility of ASF at local restaurants and at local retailers and markets. We may also consider the regulations and permitted accessibility to ASF in line with ASF. Finally, we may also consider the presence of marketing and m essaging about value of ASF. The indicator uses an inductive approach to capture what factors are influencing dietary behavior at each of the levels. Then we use a deductive approach to assess the strength of the factors related to ASF food intake on a scale from 0 (low) to 3 (high), using thematic analysis
Unit of Measure: Observed shifts (qualitative)
Data Type: Index
Disaggregated by: Level
PLAN FOR DATA COLLECTION
Data Source: Relevant reference individuals or groups who are both current consumers of ASF and target consumers of ASF.
Method of Data Collection and Construction: Key Informant Interviews with multiple purposive sample and potentially Photovoice[56], resource and time permitting.

[5555] "7 Behavioral Indicators of Diet and Physical Activity." Institute of Medicine. 2002. *Dietary Risk Assessment in the WIC Program*. Washington, DC: The National Academies Press. doi: 10.17226/10342.

[56] As detailed in Perceived community environmental influences on eating behaviors: A Photovoice analysis Ana Paula Belon, Laura M. Nieuwendyk, Helen Vallianatos, and Candace I.J. Nykiforuk* University of Alberta, Canada. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5241160/pdf/nihms6441.pdf, we plan to consider having a small sample of individuals take pictures of meaningful environmental factors that influenced eating behaviors, especially any

Reporting Frequency: Baseline, Mid-Line, Final
Responsible individual(s) at the Activity: Market Systems Change Advisor and MSA
BASELINE
Baseline Timeframe: May 2020
DATA QUALITY ISSUES
Dates of Previous Data Quality Assessments and Name of Reviewer(s): N/A
Date of Future Data Quality Assessments: Internal data quality assessments on will be conducted in the baseline data analysis interpretation workshop and again at midline and final assessment.
Known Data Limitations: It is difficult to get precise data on data of this nature and we will take effort to minimize selection, affect, and question bias.
THIS SHEET WAS LAST UPDATED ON: November 2019

consumption of ASF. Then individuals are interviewed to capture why and how the photo taken influenced eating behaviors.